No. 98-830-CFX Title: Amoco Production Company, etc., Petitioner
v.
Southern Ute Indian Tribe, et al.

Docketed: November 19, 1998 Court: United States Court of Appeals for the Tenth Circuit

Entry	Date	Proceedings and Orders
	Oct 9 1998	Application (A98-290) to extend the time to file a petition for a writ of certiorari from October 18, 1998 to November 18, 1998, submitted to The Chief Justice.
	Oct 15 1998	Application (A98-290) granted by the Chief Justice extending the time to file until November 18, 1998.
	Nov 6 1998	Application (A98-290) to extend further the time to file a petition for a writ of certiorari from November 18, 1998 to December 17, 1998, submitted to The Chief Justice.
	Nov 12 1998	Application (A98-290) denied by the Chief Justice.
	Nov 18 1998	Petition for writ of certiorari filed. (Response due January 4, 1999)
	Dec 15 1998	Order extending time to file response to petition until December 23, 1998.
	Dec 21 1998	Brief of respondent Southern Ute Indian Tribe in opposition filed.
	Dec 22 1998	Brief amici curiae of Montana, et al. filed.
	Dec 22 1998	Brief amici curiae of Mountain States Legal Foundation, et al. filed.
	Dec 22 1998	Brief amicus curiae of Campbell County, Wyoming filed.
	Dec 22 1998	LODGING consisting of ten copies each of Wyoming Property Taxation for 1997 and 1998 submitted by counsel for amicus Campbell County, Wy.
	Dec 22 1998	Brief amicus curiae of LaPlata County, Colorado filed.
	Dec 23 1998	Order further extending time to file response to petition until January 4, 1999.
	Dec 23 1998	Brief amici curiae of Coal Bed Methane Ad hoc Committee, et al. filed.
	Dec 23 1998	Brief amicus curiae of Independent Petroleum Association of Mountain States filed.
	Dec 23 1998	Brief amicus curiae of National Association of Royalty Owners, Inc. filed.
	Jan 4 1999	Brief of Federal Respondents in opposition filed.
	Jan 6 1999	DISTRIBUTED. January 22, 1999
	Jan 7 1999	Reply brief of petitioners Amoco Production Company, et al. filed.
	Jan 22 1999	Petition GRANTED. The brief of petitioner is to be filed with the Clerk and served upon opposing counsel on or before 3 p.m., Friday, March 5, 1999. The brief of respondents is to be filed with the Clerk and served upon opposing counsel on or before 3 p.m., Friday, April 2, 1999. A reply brief, if any, is to be filed with the Clerk and served upon opposing counsel on or before 3 p.m., Friday, April 16, 1999. Rule 29.2 does not apply. Justice Breyer OUT. SET FOR ARGUMENT April 19, 1999.

3 pp

No. 98-830-CFX

Entry	Date	Proceedings and Orders
		**********
	Jan 29 1999	Order granting certiorari amended limited to the following question: Whether, in reserving to the United States "coal" in lands patented under the 1909 and 1910 Coal Lands Act, 30 U.S.C. Sec. 81, 83-85, while passing the surface land and all other minerals (including natural gas) to the patentee, Congress reserved only the solid rock fuel commonly known as "coal," but not natural gas in coa formations. Briefing schedule is unchanged. Justice Breyer took no part in the consideration or decision of this order.
	Mar 4 1999	Brief amicus curiae of Independent Petroleum Association of Mountain States filed.
	Mar 4 1999	Brief amicus curiae of Campbell County, Wyoming filed.
	Mar 4 1999	Brief amici curiae of Montana, et al. filed.
	Mar 4 1999	Brief amici curiae of Mountain States Legal Foundation, et al. filed.
	Mar 4 1999	Motion of Wyoming for leave to participate in oral argument as amicus curiae and for additional time for oral argument filed.
	Mar 5 1999	Joint appendix filed.
	Mar 5 1999	*Joint appendix in two volumes.
	Mar 5 1999	Brief of petitioners Amoco Production Company, et al. filed.
	Mar 5 1999	Brief amicus curiae of LaPlata County, Colorado filed.
	Mar 5 1999	Brief amici curiae of Coal Bed Methane Ad hoc Committee, et al. filed.
	Mar 10 1999	Record filed.
	Mar 12 1999	CIRCULATED.
	Mar 16 1999	Motion of Solicitor General for divided argument filed.
	Mar 29 1999	Motion of Wyoming for leave to participate in oral argument as amicus curiae and for additional time for oral argument DENIED. without prejudice to file a motion to divide time with petitioners. Justice Breyer OUT.
	Mar 29 1999	Motion of Solicitor General for divided argument GRANTED. Justice Breyer OUT.
	Mar 29 1999	Record filed.
	Mar 30 1999	Motion of Wyoming for leave to participate in oral argument as amicus curiae and for divided argument filed.
	Apr 2 1999	Brief of respondent Southern Ute Indian Tribe filed.
	Apr 2 1999	Brief amicus curiae of National Mining Association filed.
	Apr 2 1999	Brief of respondents Federal Respondents filed.
	Apr 2 1999	LODGING consisting of 10 copies of an article by Andrew Scott, et al, AAPG Bulletin, V.78, no.8 (August 1994) submitted by the Solicitor General and distributed.
	Apr 5 1999	Motion of Wyoming for leave to participate in oral argument as amicus curiae and for divided argument GRANTED. to be divided as follows: 20 minutes for petitioner and 10 minutes for Wyoming. Justice Breyer OUT.
	Apr 12 1999	Reply brief of petitioner Amoco Production Company filed.

No. 98-830-CFX

Entry	Date	Proceedings and Orders
	Apr 19 1999	ARGUED.

Supreme Court, U.S.
FILED
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OFFICE OF THE CLERK

No. 98-——

IN THE
Supreme Court of the United States
OCTOBER TERM, 1998

AMOCO PRODUCTION COMPANY,
on behalf of itself and the class it represents,*
Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,
Respondent.

Petition for a Writ of Certiorari to the United States Court of Appeals for the Tenth Circuit

PETITION FOR A WRIT OF CERTIORARI

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QUESTION PRESENTED

Whether, in reserving to the United States "coal" in lands patented under the 1909 and 1910 Coal Land Acts, 30 U.S.C. §§ 81, 83-85, while passing the surface land and all other minerals (including natural gas) to the patentee, Congress reserved only the solid rock fuel commonly known as "coal," but not natural gas in coal formations, as the Department of Interior determined in a formal Solicitor's opinion entitled to judicial deference under *Chevron U.S.A., Inc.* v. *Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984).

LIST OF PARTIES AND AFFILIATES

In addition to the petitioners, the following federal agencies and officials were defendants-appellees below:

> Manuel Lujan, Jr., Secretary of the United States Department of Interior; the Department of Interior, and its subordinate agencies; Bureau of Indian Affairs; Bureau of Land Management; Minerals Management Service; Eddie F. Brown, Assistant Secretary of the Bureau of Indian Affairs; Delos Cy Jamison, Director of the Bureau of Land Management; and Scott S. Sewell, Director of the Minerals Management Service.

There was also one defendant who was not an appellee: Tiffany Gas Company.

Pursuant to Rule 29.6 of the Rules of this Court, Amoco Production Company declares that its parent company is Amoco Company (whose parent is Amoco Corporation), and that it has no subsidiaries that are not wholly owned.

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1998

No. 98——

AMOCO PRODUCTION COMPANY,
on behalf of itself and the class it represents,
Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,
Respondent.

Petition for a Writ of Certiorari to the United States Court of Appeals for the Tenth Circuit

---

PETITION FOR A WRIT OF CERTIORARI

Amoco Production Company ("Amoco"), on behalf of itself and the class of defendants it represents, hereby petitions this Court for a writ of certiorari to review the judgment of the United States Court of Appeals for the Tenth Circuit.

OPINIONS BELOW

The panel opinion of the court of appeals is reported at 119 F.3d 816 (Appendix to Petition for Certiorari ("App.") 52a-94a), and the opinion of the court of appeals *en banc* modifying the panel opinion in part is reported at 151 F.3d 1251 (App. 1a-51a). The opinion and order of the United States District Court for the District of Colorado awarding summary judgment to petitioners is reported at 874 F. Supp. 1142 (App. 95a-132a).

JURISDICTION

The order of the court of appeals *en banc* reversing the district court's order of summary judgment was entered

on July 20, 1998. This Court granted an extension of time in which to file the petition for certiorari to and including November 18, 1998. The jurisdiction of this Court is invoked under 28 U.S.C. § 1254(1).

STATUTES INVOLVED

The statutes involved in this case are 30 U.S.C. §§ 81 & 83-85, which are reproduced in the appendix at 133a-136a.

STATEMENT OF THE CASE

In the Coal Land Acts of 1909 and 1910, 30 U.S.C. §§ 81 & 83-85, Congress reserved "coal" to the United States in any lands patented thereunder, while passing the surface land and all other minerals (including natural gas) to the patentee. Respondent the Southern Ute Indian Tribe ("Tribe"), owner of reserved coal in certain Colorado lands pursuant to a 1938 transfer from the United States, claimed that the reservation of "coal" included natural gas found in coal formations.[1] In a decision flatly at odds with the statutory language and legislative history, a divided court of appeals held that the word "coal" in the 1909 and 1910 Acts was ambiguous. App. 32a-33a. In resolving that ambiguity, the court refused to give deference under *Chevron U.S.A., Inc.* v. *Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984), to a formal and binding opinion of the Solicitor of the Department of Interior that Congress' reservation of "coal" did not include coalbed gas. The court held

[1] Natural gas in coal formations, often referred to as "coalbed gas" or "coalbed methane" (CBM), is chemically indistinguishable from natural gas found in other formations. Natural gas exists in coalbeds in the same physical states as it does in other reservoir rocks, as the Department of Interior has recognized. *See Rights to Coalbed Methane Under an Oil & Gas Lease for Lands in the Jicarilla Apache Reservation*, 98 Interior Dec. 59, 60 (1990) (App. 165a-166a). Like other natural gas, CBM is produced from gas wells and processed in gas plants; it is combined and transported in pipelines with gas from other geologic formations; and it is used for the same purposes.

that *Chevron* did not apply to a statutory interpretation not embodied in a legislative rule promulgated by notice-and-comment procedures or in an agency adjudication. App. 83a-88a. Accordingly, it applied the presumption that ambiguity in land grants is resolved in favor of the sovereign, and held that by reserving "coal" Congress also reserved natural gas in coalbeds (but not the gas that may have migrated from coalbeds to adjacent rock strata). App. 33a & 18a n.8. In this Court, petitioners challenge the court of appeals' contorted interpretation of the 1909 and 1910 Acts and its ruling under *Chevron* that conflicts with precedent of this Court and of the majority of other courts of appeals.

Historical Background. This case has its roots in the settlement of the West and in Congress' efforts at the turn of the century to husband coal to fuel the country's change from an agrarian to an industrial economy.

In the second half of the nineteenth century, Congress sought to develop the vast territory west of the Missouri River that maps of the time "forbiddingly referred to as the 'Great American Desert.'" *Leo Sheep Co.* v. *United States*, 440 U.S. 668, 670 (1979). Accordingly, Congress instituted sweeping changes in the administration of public lands. It granted public lands to those who would build railroads, roads, and canals that would link the West to the East, *id.* at 671-77, and provided free land in fee simple absolute for homesteaders. See Homestead Act, § 2, 12 Stat. 392-93 (1862). Congress also abandoned its traditional practice of reserving mineral lands from public sale. See Robert W. Swenson, *Legal Aspects of Mineral Resources Exploitation, in* Paul N. Gates, *History of Public Land Law Development* 699, 706-07 (reprint ed. 1979). In the Mining Law of 1872, Congress authorized the sale of public lands in fee simple to mining claimants at rates of $2.50 to $5.00 per acre. See 30 U.S.C. §§ 29, 30, 37. Coal lands received special treatment, as they had historically. See Swenson, *supra* at 724 & n.181. Congress authorized private entry onto coal

lands in 1864 and again in 1873, setting a maximum limit of 160 acres on individual entry and minimum prices of $10 to $20 per acre. See Act of July 1, 1864, ch. 205, 13 Stat. 343; Act of March 3, 1873, ch. 279, 17 Stat. 607. As under the homestead, land-sale, and mining laws, the coal lands entryman received fee-simple title to the coal land, with no reservation of any part of the mineral estate to the United States.

At the turn of the twentieth century, a "coal famine" struck the West, and concerns rose about the price, supply, and control of the country's primary source of energy. See *Hearings on Coal Lands and Coal-Land Laws of the United States Before the House Comm. on Pub. Lands,* 59th Cong. 12-13 (1907) (testimony of Edgar E. Clark, Interstate Commerce Commissioner) ("*Clark Testimony*"). At the same time, widespread fraud in coal-land administration had been uncovered. The Department of Interior had relied largely on affidavits of entrymen as to the mineral or nonmineral character of lands. *Clark Testimony,* at 1-3. Unwilling to pay the steep prices for coal lands set in the 1873 Act or to abide by the Act's acreage limitations, companies (especially railroads) connived to have individuals falsify affidavits and claim lands under homestead or other land laws for a pittance, and then turn the land over to the companies. Carl J. Mayer & George A. Riley, *Public Domain, Private Dominion* 117 (1985). Most of the coal lands that passed into private hands between 1873 and 1906 were not properly patented under the 1873 Coal Land Act. *Id.; Clark Testimony,* at 6. President Roosevelt responded in 1906 by withdrawing 66 million acres of land containing "workable coal" from entry and transfer under the homestead and other land laws. Swenson, *supra,* at 726-27.

The Coal Land Acts of 1909 and 1910. Roosevelt's order prompted an outcry from western interests concerned about its impact on settlers. See 43 Cong. Rec. 2504 (1909) (statement of Rep. Mondell); Swenson, *supra,* at 726-27. For three years after Roosevelt's order, Congress struggled to reconcile the competing interests of promoting settlement and retaining federal control of coal. A number of bills were introduced that would have taken the novel step of severing the surface and mineral estates, some of which specifically would have reserved "natural gas" as well as "coal" to the United States in public lands.[2]

Compromise was finally struck on the last day of Roosevelt's presidency in the Coal Land Act of 1909, Act of March 3, 1909, ch. 270, 35 Stat. 844 (codified at 30 U.S.C. § 81) ("1909 Act"). The 1909 Act authorized the issuance of patents to "any person who has in good faith located, selected, or entered under the nonmineral land laws of the United States any lands which subsequently are classified, claimed, or reported as being valuable for coal," upon proof of compliance with those land laws. 30 U.S.C. § 81. The Act, however, mandated that the patent "shall contain a reservation to the United States of all *coal* in said lands, and the right to prospect for, mine, and remove the same." *Id.* (emphasis added). The Act preserved the right of the patentee to "mine coal for use on the land for domestic purposes prior to the disposal by the United States of the coal deposit." *Id.*

In debate over the 1909 Act, Representative Mondell of Wyoming, chairman of the House Public Lands Committee, explained that the Act "is the first legislation before Congress providing for a limited patent, or a patent reserving the mineral. It is necessary in the opinion of our committee by reason of the conditions that exist."

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[2] *See* 41 Cong. Rec. 630 (1907) (bill by Rep. Volstead "reserving coal, lignite, petroleum, and natural-gas deposits from disposal . . . under existing land laws"); *id.* at 1483-84 (bill by Sen. LaFollette "reserving from entry and sale the mineral rights to coal and other materials mined for fuel, oil, gas, or asphalt" while providing for sale of the surface lands); *id.* at 1788 (bill by Sen. Nelson "to provide for the reservation of the coal, lignite, oil, and natural gas in the public lands").

43 Cong. Rec. 2504 (1909). The Committee had discussed at length whether to reserve other minerals, Rep. Mondell acknowledged, but it determined that the limited reservation of coal "is quite a sufficient departure from the past practice of the Government" and "as far as we will go in th[e] direction" of issuing limited patents. *Id.*

Although the 1909 Act addressed the rights of persons who had entered coal lands in the past, Congress remained concerned that the prohibitive price of coal lands deterred new settlement. See 45 Cong. Rec. 6042 (1910) (statement of Rep. Mondell); H.R. Rep. No. 61-377 (1910). Congress passed in 1910 a parallel Act that authorized patents for new entrymen under nonmineral land laws, and contained an identical reservation of coal to the United States. Act of June 22, 1910, ch. 318, 36 Stat. 583 (codified by section at 30 U.S.C. §§ 83-85) ("1910 Act"). Congress again rejected calls to broaden the reservation to other minerals, including gas.[3]

Natural Gas in Coal Formations. Even though Congress declined to reserve natural gas in the 1909 and 1910 Acts, thus allowing the entire natural gas estate to pass to the patentee, the issue in this case is whether its reservation of "coal" encompasses natural gas found in coalbeds. Such gas is referred to in the trade as "coalbed methane" (CBM), but that is a misnomer, for like any natural gas it is a mixture of methane and small amounts of other gases. See James E. Fassett, *Coal-Bed Methane—A Contumacious, Free-Spirited Bride; The Geologic Handmaiden of Coal Beds, in Energy Frontiers in the Rockies* 131, 132 (John C. Lorenz et al. eds., 1989); B.P. Tissot & D.H. Welte, *Petroleum Formation & Occurrence* 199 (2d ed. 1984). Natural gas is formed from the chemical breakdown of organic matter that is exposed to microorganisms and high temperatures during its pro-

[3] H.R. Rep. No. 61-377, at 5 (1910) (letter from Secretary of Interior Ballinger); 45 Cong. Rec. 6044 (1910) (statement of Rep. Stephens).

gressive burial under the earth's surface. *Id.* at 71-79, 201-18. "[T]he same geological processes of bacterial action, burial, compaction, and geothermal heating" that produce oil and natural gas also produce coal and natural gas. *Id.* at 229. Methane and other gases are chemically separated from the coal over periods of millions of years as organic matter is converted into coals of increasing carbon content ("coalification"). *Id.* at 247. Because coalification yields a coal rock that is permeable and porous, the coal also acts as a reservoir for the gas that is produced, Fassett, *supra*, at 132, as well as for gas migrating from other formations. Coal is not unique in this respect; carbonaceous shales, for example, also are both the source and the reservoir of natural gas.[4] Even so, coalification generates far more methane than can be stored in the coal itself; indeed, most of the methane generated (over 90% for some coals) escapes from the coalbed, Tissot & Welte, *supra*, at 248, and is often trapped in other reservoir rock.

The 1981 Solicitor's Opinion on Coalbed Gas Rights in Federal Lands. Coalbed gas, historically known as "marsh gas" or "fire damp," had long been regarded as a deadly hazard for coal miners (as well as many a canary). Fassett, *supra*, at 131. In the 1970's, however, scientists came to recognize coalbed gas as a potentially significant commercial resource. See, *e.g.*, M. Deul & A. Kim, *Coalbed Gas: A Source of Natural Gas*, Oil & Gas J., June 16, 1975, at 47. In the aftermath of the Arab oil embargo of that decade, the federal government began to promote the production of fuels that were expensive to produce (like gas from "tight sands" or coalbeds) through grants, see, *e.g.*, 42 U.S.C. §§ 5901-15, and substantial tax credits, see 26 U.S.C. § 29.

[4] *See* Robert C. Milici, *Autogenic Gas (Self Sourced) From Shales —An Example From the Appalachian Basin, in The Future of Energy Gases* 253, 256 (U.S.G.S. Prof. Paper 1570, David G. Howell, ed. 1993).

Because extensive coalbed gas reserves are found in the millions of acres of lands covered by the 1909 and 1910 Acts, the question of title to coalbed gas came before the Department of Interior in its capacity as the agency that administers the 1909 and 1910 Acts. In that capacity, Interior determines whether lands are valuable for coal and issues patents reserving coal in those lands, 30 U.S.C. §§ 81, 83, 85; 43 C.F.R. § 2093.1-3; adjudicates disputes arising under those patents, cf. 43 C.F.R. §§ 4.1, 4.450-1; and leases the reserved coal under the Mineral Leasing Act of 1920, 30 U.S.C. § 201. Although most of the patents were issued in the first half of this century, the Department continues to this day to issue land patents reserving coal under the 1909 and 1910 Acts. See *Public Lands Statistics* 54-55 (1997).

In 1981, the Solicitor of Interior issued an opinion that the reservation of "coal" to the United States in the 1909 and 1910 Acts did not include coalbed gas. *Ownership of And Right to Extract Coalbed Gas in Federal Coal Deposits* (M-36935), 88 Interior Dec. 538 (1981) (App. 140a, 143a). Under internal departmental rules issued by the Secretary of Interior, such published opinions represent the Department's "final legal interpretations . . . on all matters within the jurisdiction of the Department, which shall be binding, when signed, on all other Departmental offices and officials and which may be overruled or modified only by the Solicitor, the Under Secretary, or the Secretary." Department of Interior, Departmental Manual 209 DM § 3.2(11) (App. 180a).

Drawing on Departmental expertise in mineral resources, the Solicitor first determined that "[c]oalbed methane is both scientifically defined and legally regarded as a gas," and that coal and CBM "are distinct, and are potentially severable." App. 143a-144a. Carefully examining the legislative history recounted above, the Solicitor determined that "[t]he statutory language and the legislative history belie the argument that Congress intended to reserve any mineral other than coal in the 1909 and 1910 Acts." App. 147a. Subsequent statutes confirmed the narrowness of the reservation, among them the Act of July 17, 1914, 30 U.S.C. §§ 121-123 ("1914 Act"), that separately reserved "gas" to the United States on lands subject to that Act,[5] and legislation in 1933 and 1955 that treated coal and other reserved minerals as distinct from the unreserved minerals they host. App. 147a-149a. Finally, the Secretary found that under the Mineral Leasing Act, coalbed gas fit the definition of "gas" in Department of Interior regulations. It therefore belonged to the holder of a federal oil and gas lease and not to the holder of a coal lease, and was properly governed by oil and gas leasing regulations. App. 152a-159a. In reliance on the Solicitor's 1981 opinion, which expressly states that its purpose was to "expedite" coalbed gas development, App. 142a, gas producers throughout the country entered into leases with the owners of the gas estate, making significant capital investments, and a boom in coalbed gas production ensued. See *infra* at 24-25.

This Litigation. The Tribe abandoned its aboriginal lands in the nineteenth century and relocated to a reservation in Colorado along with other Ute tribes. After the infamous "Meeker Massacre" of settlers by members of a different Ute tribe, Congress in 1880 extinguished all tribal ownership of reservation lands, resettled the Tribe to unoccupied lands along the La Plata River, allotted lands to individual Indians, and provided for the remainder to be ceded back to the United States. See *United States v. Southern Ute Tribe*, 402 U.S. 159, 161-65 (1971). Many of those ceded, non-allotted lands were patented to settlers under various public land laws, subject after the 1909 and 1910 Acts to a reservation of coal to the United States. In 1938, pursuant to a statute that authorized restoration of tribal ownership of reservation lands (with-

[5] The Solicitor expressly determined that coalbed gas was reserved as "gas" in lands patented under the 1914 Act that were classified as valuable for gas. App. 151a-152a.

out impairment of any existing rights to the land), the Department of Interior conveyed equitable title to the Tribe in approximately 450,000 acres where no homestead had been established and 200,000 acres of coal that had been reserved to the United States under the 1909 and 1910 Acts. As a result of these transfers, "the Tribe's reservation is a checkerboard" of Indian and non-Indian lands, App. 109a-110a; a tract in which the Tribe owns the surface and all minerals often is adjacent to another in which the Tribe owns only the coal: the surface and other minerals have been patented to settlers.

The Southern Ute reservation is located within the San Juan Basin, which is the leading CBM-producing basin in the West. Cf. App. 181a (map of major coalbed gas reserves). In reliance on the 1981 Solicitor's opinion, oil and gas companies entered into leases to produce coalbed gas with individual landowners holding title under 1909 and 1910 Act patents to the more than 200,000 acres where the Tribe owned only the coal. In tribal lands, the Tribe issued oil and gas leases to the same producers for coalbed gas production. The Tribe pooled its lands with non-Indian fee lands in communitization agreements and granted rights of way across tribal lands and roads, sharing royalties for the coalbed gas with the fee owners.

Its conduct notwithstanding, in 1991 the Tribe brought this action in federal district court in Colorado against petitioners, royalty owners and producers under leases covering the 200,000 acres where the Tribe owned the coal, as well as various federal officials responsible for land held in trust for the Tribe. The Tribe alleged that Congress' reservation of "coal" to the United States in lands patented under the 1909 and 1910 Acts included natural gas in coal formations, and therefore it owned the gas pursuant to the transfer of federal interests in coal to the Tribe in 1938. The Tribe sought, among other things, a declaration to that effect and an award of dam-

ages against petitioners for trespass, conversion, and unpaid tribal taxes.

In 1992, the district court certified a class of nonfederal defendants (naming Amoco as class representative), and in 1994 it awarded summary judgment to the class and the federal defendants on the basis of its interpretation of the plain meaning of the term "coal" in the 1909 and 1910 Acts. App. 99a. The district court reviewed dictionaries from the early Twentieth Century that uniformly defined coal as a solid, but held that in any event "common sense dictates that in 1909 and 1910, Congress intended 'coal' to mean the solid rock substance." App. 112a-114a. Given that the Acts did not once mention "gas" or "constituents" of coal, the district court stated that "it would require not merely some, but herculean ingenuity to create ambiguity in the 1909 and 1910 Acts." App. 115a.

Examining the legislative history, the district court concluded that Congress meant "to depart in the most narrow way possible from the historic practice of the United States to grant fee simple absolute title to homesteaders," and reserved only the solid rock coal "to insure an adequate source of the nation's primary energy resource." App. 123a-124a. The district court also found significant that the 1914 Act separately reserved "gas" and other named minerals on lands valuable for those minerals, and that it was not until the Homestead Act of 1916 that Congress broadly reserved "all the coal and other minerals," 43 U.S.C. § 299, in patented lands. App. 124a-127a. Even if ambiguity could be wrung from the term "coal," the district court held in the alternative, the 1981 Solicitor's opinion was entitled to *Chevron* deference. App. 128a-129a.

On appeal, the Tenth Circuit reversed. A panel of the court held that the term "coal" was ambiguous, that the 1981 Solicitor's opinion was not entitled to *Chevron* deference in resolving that ambiguity, and that the ambiguity should be resolved against the grantee so that no public

land passed by implication. App. 52a-94a. The court granted rehearing *en banc* limited to the question of whether the term "coal" in the 1909 and 1910 Acts "unambiguously excludes or includes CBM." App. 8a. By a 6-3 decision, with 4 judges recused, the court *en banc* agreed with the panel that the 1909 and 1910 Acts were ambiguous, and adopted the panel opinion with modifications. App. 8a-10a.

The *en banc* court began its analysis, before it even addressed the text of the 1909 and 1910 Acts, with the admonition that "[o]f critical importance is the long recognized principle of statutory construction, applicable here, that ambiguity or uncertainty in the terms employed in land grants should be resolved in favor of the government." App. 10a-11a (quotation and brackets omitted). The court then summarily dispensed with an analysis of the statutory language, claiming that because "[the] Acts neither define coal nor mention CBM," therefore "the statutes do not by their plain language indicate congressional intent regarding CBM." App. 14a.

The court then undertook to divine "Congress' specific intent to include or exclude CBM in its reservation of coal." App. 14a. Relying on what it believed were ambiguous discussions of coal's chemical composition in contemporary texts, and on modern scientific findings that *in situ* most CBM is molecularly attracted to the surface of the coal in a state of "adsorption," the court concluded that "CBM is not sufficiently like other natural gases for us to conclude that Congress in 1909 unambiguously intended the owners of other natural gases to also own CBM associated with the reserved coal." App. 18a-19a. Because CBM was regarded as a waste product that at the time could only be extracted by damaging the coal, the court doubted that Congress formed "a specific intent to convey CBM as a gas." App. 24a. The court found present-day exploitation of CBM by the coal owner to be consistent with Congress' "general intent" to reserve all coal that may have future economic value. App. 32a.

Having determined that the term "coal" in the 1909 and 1910 Acts "neither unambiguously includes or excludes coalbed methane," the court of appeals resorted to the presumption that doubts respecting land grants are resolved in favor of the government, and held that the reservation of coal "includes the adsorbed CBM." App. 32a-33a. The court specifically declined to "address ownership of CBM that may have migrated away from the coal into adjacent non-coal strata." App. 18a n.8.

The *en banc* court left undisturbed the panel's decision that, even though the 1909 and 1910 Acts were held to be ambiguous, the Solicitor's 1981 opinion was not entitled to *Chevron* deference in resolving that ambiguity. App. 10a. In the panel opinion, the court held that it would not pay deference "to agency policies promulgated in formats other than legislative rules or adjudications." App. 84a. Though acknowledging that internal Interior rules provided that published Solicitor opinions of this kind are binding, the court ruled that *Chevron* did not apply to statutory interpretations issued without the "procedural protections" of notice-and-comment rulemaking. App. 87a.

Judge Tacha, joined by Judges Anderson and Baldock, dissented from the *en banc* decision. Judge Tacha pointed out that "coal" was uniformly defined in dictionaries of the time as a solid rock fuel, and "it is extremely unlikely . . . that a people as familiar with CBM gas as the people of 1909 would define coal as a 'solid' if they also thought of CBM gas as coal." App. 37a. Because CBM's status as a waste product makes its ownership undesirable, "one would not expect the United States to reserve it," underscoring that Congress did no more than reserve the solid rock fuel known as coal. App. 39a. Judge Tacha faulted the majority for its "central interpretive error" of deducing that the failure of the statutes to define "coal" or mention CBM creates ambiguity as to whether Congress reserved CBM to the United States. "Silence does not equate with ambiguity." App. 39a-40a.

Judge Tacha further criticized the majority for inferring that Congress would have distinguished between the CBM remaining in the coalbed and the 90 percent of coalbed gas that strays into adjacent rock. App. 40a-41a. She also dismissed the majority's claim that CBM's adsorption to the pores of the solid coal is of legal relevance. "Physical sorption occurs between gases of all types and solids," and involves the same pervasive forces of molecular attraction that bind paper to the table on which it sits. App. 43a. Finally, the majority's claim that CBM could not be extracted without damaging the coal, even if true, has no bearing on the issue of ownership. Where split estates are at issue, the common law has always distinguished between ownership and the right of extraction, and the rule of accommodation has always permitted the owner of other minerals to extract them so long as "he does not unreasonably damage the coal." App. 47a. Coal has a plain and ordinary meaning in the 1909 and 1910 Acts that does not encompass coalbed gas. App. 50a-51a.

REASONS FOR GRANTING THE PETITION

The court of appeals below committed fundamental error in interpreting important public lands statutes, thereby upsetting settled expectations of property rights in natural gas worth billions of dollars. In construing the reservation in the 1909 and 1910 Acts to the United States of "coal" to include marsh gas (now known as CBM), the Tenth Circuit ruled that the Acts had no plain meaning because they did not define the everyday term "coal." The court brushed aside clear evidence that Congress intended only to reserve the solid rock fuel commonly known as coal: namely, the fact that Congress had never before reserved any mineral to the United States in a land patent; had rejected proposals to reserve other minerals (including natural gas) to the United States; and reserved coal only in response to a crisis in the supply of this solid rock fuel and concern about its fraudulent accumulation by railroads and other commercial in-

terests. The court further presumed without evidence that Congress established ownership of gas based on its subsurface location, a concept foreign to basic minerals law and unworkable in practice. Thus, violating basic principles of statutory construction, the court bent over backwards to find ambiguity where none exists. The court of appeals compounded its error by refusing to grant *Chevron* deference to the Department of Interior's interpretation of the statute in the 1981 Solicitor's opinion to resolve the purported ambiguity, improperly limiting *Chevron* to legislative rules and adjudications despite precedent of this Court to the contrary.

This case presents multiple, compelling reasons for this Court to grant certiorari. On the important issue of whether *Chevron* deference should only be paid to agency interpretations embodied in legislative rules or agency adjudications, there is a 4-8 split in the courts of appeals that this Court should resolve. Circuit split aside, the ownership of coalbed gas in the more than 20 million acres of lands patented under the 1909, 1910, and related Acts is an important question of federal law that this Court should settle now.

The ruling below has created untenable title uncertainty in coalbed gas worth billions of dollars. It has disrupted production of this critical energy resource because new development will not be undertaken when title is uncertain. The disruption was so severe in Wyoming that Congress, though not addressing many of the major effects of the ruling, responded quickly by passing an Act intended to provide limited relief for producers and royalty owners under certain existing leases. In addition, the decision below has created immediate financial hardship for individual landowners and small producers and sown confusion in federal, state, and local taxation of coalbed gas (in particular entitlement to major federal tax credits for nonconventional fuel development). This Court should grant certiorari to consider this question of paramount national importance.

I. THE COURT OF APPEALS FUNDAMENTALLY MISINTERPRETED MAJOR PUBLIC LANDS STATUTES.

In statutory construction, "deference to the supremacy of the Legislature, as well as recognition that Congressmen typically vote on the language of a bill, generally requires [courts] to assume that the legislative purpose is expressed by the ordinary meaning of the words used." *United States* v. *Locke*, 471 U.S. 84, 95 (1985). Few terms would have been better understood in common parlance in 1909 than the word "coal," the solid rock fuel that was the country's primary energy resource at the turn of the century. See Sam H. Schurr et al., *Energy in the American Economy—1850-1975*, at 64, 68-69 (1960).

Dictionaries of the time establish plain meaning, see *American Textile Mfrs. Inst.* v. *Donovan*, 452 U.S. 490, 508-09 (1981), and predictably they uniformly define coal as a solid distinct from marsh gas.[6] But as the district court found, it is not necessary to resort to dictionaries when the meaning of a statutory term is clear as a matter of common sense. App. 114a. Common sense dictates, as this Court has recognized, that natural gas, a fugacious mineral, "differ[s] from solids in place such as coal." *Champlin Ref. Co.* v. *Corporation Comm'n*, 286 U.S. 210, 232 (1932); see also *United States* v. *Buffalo Natural Gas Fuel Co.*, 172 U.S. 339, 342 (1899) (relying on testimony that the statutory term "crude bitumen" encompassed many distinct substances, including those that are "gaseous, as natural gas or marsh gas" and those that are "solid, as . . . bituminous or anthracite coal"). Furthermore, it defies common sense to infer that Congress intended to reserve marsh gas—a known hazard and waste product of coal mining with no contemplated present or future value—while it passed to the patentee all noncoal minerals in the land, including *precious* minerals like oil.

[6] *See, e.g.*, *The Universal Encyclopaedic Dictionary* 945, 2637 (1905) (defining "coal" as "a stratified rock" and separately defining "marsh gas" as "a hydrocarbon gas very abundant in nature"); *American Dictionary of the English Language* 244 (1889) (coal is a "solid, combustible substance"); II *A New English Dictionary* 549 (1893) (coal is "a mineral, solid, hard, opaque").

The court of appeals nonetheless reached this result by breaching the most fundamental tenets of statutory construction. It stated at the outset, before it had even analyzed the statutory text, that "[o]f critical importance" to this case is the canon that ambiguity in public land grants is resolved in the favor of the sovereign, and that "[t]he burden remains on defendants to dispel any ambiguity in the construction of the coal reservation." App. 10a-11a. But this Court has admonished that rules for resolving statutory ambiguity "come[] into operation at the end of the process of construing what Congress has expressed, not at the beginning as an overriding consideration." *Chapman* v. *United States*, 500 U.S. 453, 463 (1991) (rule of lenity); *Chevron*, 467 U.S. at 842-43 & n.9 (agency deference).

Moreover, as this Court stated just last Term, discussing the rule of lenity: "The simple existence of some statutory ambiguity . . . is not sufficient to warrant application of that rule, for most statutes are ambiguous to some degree." *Muscarello* v. *United States*, 118 S. Ct. 1911, 1919 (1998). Tiebreaking presumptions are only invoked "if, after seizing everything from which aid can be derived, we can make no more than a guess as to what Congress intended." *Id.* (quotation marks omitted). This Court has consistently emphasized this same principle in land-grant cases, declaring that "the well-settled rule of this court that public grants are construed strictly against the grantees" does not mean that such grants are "to be construed to defeat the intent of the legislature, or to withhold what is given either expressly or by necessary or fair implication." *Leo Sheep*, 440 U.S. at 682-83 (quotation omitted).

The court of appeals aggravated its error by refusing to give the term "coal" its plain meaning, reasoning that

because the "1909 and 1910 Acts neither define nor mention CBM[,] . . . the statutes do not by their plain language indicate congressional intent regarding CBM." App. 14a. But the absence of any definition addressing CBM does not entitle a court to disregard the plain meaning of the term "coal." Quite the contrary, "[w]hen a word is not defined by statute, we normally construe it in accord with its ordinary or natural meaning." *Smith* v. *United States*, 508 U.S. 223, 228 (1993). As Judge Tacha aptly put it in dissent, "Silence does not equate with ambiguity." App. 40a.

Although the meaning of "coal" is clear as day, the Tenth Circuit purported to find ambiguity based on discussions of the chemical composition of coal in certain contemporary texts. Aside from the errors in the Tenth Circuit's chemical analysis,[7] this Court has held that the

[7] The court of appeals misread these texts, illustrating the pitfalls of a court's unguided foray into scientific analysis, particularly if the effort is result-oriented. First, the Tenth Circuit relied on a dictionary description of coal as an "amorphous" substance consisting of "hydrocarbons" as support for its claim that "coal" was understood at the time to include methane gas. App. 16a. But that very dictionary defines "amorphous" as a term indicating that a *solid* (such as coal) lacks a crystalline structure. *Funk & Wagnalls New Standard Dictionary of the English Language* 94 (1913). Furthermore, solid coals are composed of many different hydrocarbons. *Coal Handbook* 11 (Robert A. Meyers, ed. 1981). There is no basis for the court's suggestion that a reference to "hydrocarbons" in "amorphous" coal is a reference to methane gas. Certainly the author of that entry did not understand coal to include gas; the next sentence (omitted by the Tenth Circuit) describes coal as "brittle, compact, massive, and sometimes laminated . . . ." *Funk & Wagnalls* at 508. Second, the Tenth Circuit adverted to a description of gas as "occluded" within coal. App. 17a. But the term "occluded" was the standard usage to indicate that a porous solid absorbed gas, *see id.* at 1706, and does not suggest that anyone conceived of the coalbed gas as coal itself. Third, the court relied on a discussion that hydrogen predominates among the "gaseous" constituents of coal. App. 17a; IV *American Cyclopaedia* 726 (1873). But the Tenth Circuit does not reveal that the encyclopedia is discussing bituminous caking coal, and is simply reciting the well known fact that in its atomic structure this low-rank *solid* coal has more hydrogen (a gas at normal atmospheric conditions) than higher ranks of coal like anthracite. *See id.* at 728; *Coal Handbook* at 11. It is not referring to CBM. Nothing in the contemporaneous sources relied on by the court of appeals gives the slightest indication that their authors would have defined the term "coal" to include coalbed gas, much less that Congress did so.

meaning of mineral reservations in federal statutes cannot be determined by esoteric scientific definition. In *Burke* v. *Southern Pac. R.R. Co.*, 234 U.S. 669 (1914), this Court, confronted with the question of whether a reservation of "mineral lands" included petroleum lands, was "asked to give effect to the strictly scientific view that petroleum is a resultant of the decomposition of organic matter . . . and therefore is not a mineral." *Id.* at 679. This Court assumed that oil was not a mineral in the scientific sense, but held that a "strictly scientific" definition "is not the test contemplated by the statute." *Id.* Congress "was dealing with a practical subject in a practical way, and we think it used the words 'mineral lands,' and intended that they should be applied, in their ordinary and popular sense." *Id.*

As the legislative history and context of the 1909 and 1910 Acts make clear, Congress was again "dealing with a practical subject in a practical way," and that practical subject was the ownership and control of *solid* coal. The lands at issue were classified as "coal lands" on the basis of the presence of certain kinds of solid coal, and classification was carried out on "air-dried" (*i.e.*, gas-free) samples of solid coal. *Classification and Valuation of Coal Lands*, 37 Pub. Lands Dec. 653 (1909) (App. 137a). Congress passed the 1909 and 1910 Acts as a practical response to a crisis in the supply of solid coal, fraudulent misclassification of lands containing valuable solid coal, and the danger of monopolization of solid coal by commercial interests. It considered and rejected bills and proposed revisions that would specifically have reserved

"gas" and other precious minerals to the United States, departing from the historic practice of granting fee-simple patents only to the extent necessary to meet the crisis at hand. See *supra* at 4-6. Congress also understood that it was creating property interests in gas, oil, and other minerals that would be leased or otherwise alienated by the patentee, and it would have defined the term "coal" if it had meant anything but its popular signification.[8] App. 37a (Tacha, J., dissenting).

Furthermore, a reservation of CBM in coalbeds is irreconcilable with the grant (undisputed by the Tribe or the court of appeals) to the patentee of the natural gas obtainable from coal lands. Unlike fixed minerals like coal, title to gas is not established by subsurface location, *Champlin Refining*, 286 U.S. at 233; under the rule of capture, the producer is entitled to all gas that flows through the well bore. *Brown* v. *Spillman*, 155 U.S. 665, 669-70 (1895). Congress cannot be presumed to have defined ownership of gas based on its subsurface location (CBM remaining in the coalbed), a concept foreign to basic minerals law. This is especially so if the Acts are given a practical construction under *Burke*; there are no chemical markers to distinguish the CBM that comes from

[8] The 1909 and 1910 Acts must be interpreted *in pari materia* with the Mineral Leasing Act, ch. 85, 41 Stat. 437 (1920), 30 U.S.C. § 182 ("MLA"), which provides for the disposition of reserved coal. *See Watt* v. *Western Nuclear, Inc.*, 462 U.S. 36, 57-59 (1983). From its inception, the MLA has treated the reserved coal as a solid, providing for its leasing on a cent-per-ton basis, 41 Stat. 439, and making no mention of or provision for CBM. Indeed, the Act as revised refers to coal as a "nongaseous hydrocarbon substance[]." 30 U.S.C. § 181. As the Tribe conceded below, CBM is clearly "gas" and not "coal" under longstanding federal leasing regulations. *Compare* 30 C.F.R. § 700.5 (defining "coal" as "combustible carbonaceous rock, classified as anthracite, bituminous, subbituminous, or lignite") & *id.* § 206.251 (similar) *with id.* § 206.151 (defining "gas" as "any fluid, either combustible or noncombustible," that is produced in a natural state from the earth and that "maintains a gaseous or rarefied state under standard temperature and pressure conditions").

the coalbed from CBM in adjacent strata or other natural gas that flows through the well bore. Congress simply would not have created the unworkable split gas estate concocted by the court of appeals.[9] The only practical interpretation of the 1909 and 1910 Acts is that the reservation of "coal" referred to the solid rock fuel commonly known by that name. No ambiguity whatsoever exists in the statutory reservations, much less a "grievous ambiguity," *Muscarello*, 118 S. Ct. at 1919, that would justify application of the presumption of construing public grants against the grantee.

II. THIS COURT SHOULD RESOLVE A DEEP SPLIT IN THE CIRCUITS OVER A LIMITATION ON *CHEVRON* DEFERENCE THAT IS INCONSISTENT WITH THIS COURT'S PRECEDENTS AND DECISIONS OF OTHER COURTS OF APPEALS

Even if there were any ambiguity in the statutes, the court of appeals should have deferred under *Chevron* to the 1981 opinion of the Solicitor of Interior. The court of appeals refused to do so, holding categorically that "agency policies promulgated in formats other than legislative rules or adjudications" are not entitled to *Chevron* deference. App. 84a. Solicitor's opinions of this kind, even though binding and final agency interpretations of a statute under internal Department rules, lack the "proce-

[9] Like certain state and district court decisions on which it relied, App. 21a-24a, the Tenth Circuit fundamentally misunderstood the mining law concept of "ownership" of oil and gas *in situ*. As this Court clarified long ago, that concept does not connote title in the same sense that one has title to a fixed mineral like coal, but rather "the exclusive right to reduce to possession the deposits of natural gas and oil found beneath the surface of the land." *Ohio Oil Co.* v. *Indiana (No. 1)*, 177 U.S. 190, 209 (1900). Absent severance of the oil and gas estate, such a right is vested "in the owners in fee of the surface of the earth within the area of the gas field." *Id.* The Tenth Circuit's novel analysis, awarding title to natural gas to the owner of the subsurface reservoir, will if unchecked breed litigation and upset settled expectations regarding the ownership of gas in reservoirs similar to coal, such as shales.

dural protections" of notice-and-comment rulemaking that are absolutely necessary for *Chevron* deference, the court declared. App. 87a.

The court's ruling is squarely in conflict with precedent of this Court, most notably *Pension Benefit Guaranty Corporation* v. *LTV Corporation*, 496 U.S. 633, 647-52 (1990), which accorded *Chevron* deference to statutory interpretations embodied in agency opinion letters. Indeed, this Court has never limited *Chevron* deference to legislative rules or adjudications or interpretations that were otherwise subject to notice-and-comment procedures. Rather, it has consistently looked to see whether the agency had adopted an official position in the exercise of delegated statutory powers, either by taking action based on its interpretation of the statute or by issuing a "binding policy pronouncement" to govern future agency action, *Metropolitan Stevedore Co.* v. *Rambo*, 117 S. Ct. 1953, 1963 n.9 (1997).[10] Because deference is warranted whenever the agency interpretation "reflects the agency's fair and considered judgment on the matter in question," *Auer* v. *Robbins*, 117 S. Ct. 905, 912 (1997) (position stated in legal brief), it is perverse to deny that deference to the format—formal legal opinions—where agency statutory analysis is the most rigorous.

Despite the consistency of this Court's precedent, a 4-8 split has emerged among the circuits as to whether *Chevron* deference should be limited to legislative rules or adjudications. Joining the Tenth Circuit in favor of the limitation are the Second, Sixth, and Federal Circuits.[11] On

[10] *See Reno* v. *Koray*, 515 U.S. 50, 61 (1995); *Japan Whaling Ass'n* v. *American Cetacean Soc'y*, 478 U.S. 221, 233-39 (1986); *Young* v. *Community Nutrition Inst.*, 476 U.S. 974, 981-84 (1986).

[11] *Motor Vehicles Mfrs. Ass'n* v. *New York State Dep't of Envtl. Conservation*, 17 F.3d 521, 534-35 (2d Cir. 1994); *Reich* v. *New York*, 3 F.3d 581, 587 (2d Cir. 1993); *Kelley* v. *E.I. DuPont De Nemours & Co.*, 17 F.3d 836, 841-42 (6th Cir. 1994); *Travelstead* v. *Derwinski*, 978 F.2d 1244, 1250 (Fed. Cir. 1992).

the other side are the Third (with whom the Tenth Circuit expressly acknowledged a split, App. 86a n.24), Fourth, Fifth, Seventh, Eighth, Ninth, Eleventh, and D.C. Circuits.[12] Given the vital importance of *Chevron* to the proper interpretation of federal statutes, and the need for regulated entities to be able to rely upon agency interpretations, this Court should grant certiorari to resolve this mature and unresolved split on a recurring issue of significance.

III. THE IMPORTANT NATIONAL QUESTION OF OWNERSHIP OF NATURAL GAS IN COAL MUST BE RESOLVED NOW TO AVOID INDUSTRY DISRUPTION AND PROFOUND UNCERTAINTY AND HARDSHIP.

In *Watt* v. *Western Nuclear, Inc.*, 462 U.S. 36 (1982), this Court granted certiorari on the question whether gravel was included in the reservation to the United States of "coal and other minerals" in the Stock-Raising Homestead Act of 1916 "in view of the importance of the case to the administration of more than 33 million acres of land patented" thereunder. *Id.* at 42. This case is a far more important public-lands case than *Western Nuclear* and involves far more valuable minerals. The

[12] *See, e.g., Elizabeth Blackwell Health Ctr. for Women* v. *Knoll*, 61 F.3d 170, 181-82 (3d Cir. 1995) (HCFA directive to state Medicaid programs); *Hicks* v. *Cantrell*, 803 F.2d 789, 793-94 & n.4 (4th Cir. 1986) (DOL regional administrator's letter); *Garvey Properties* v. *First Fin. S. & L. Ass'n*, 845 F.2d 519, 521 (5th Cir. 1988) (FHLBB general counsel opinion letter); *Wisconsin Dep't of Health* v. *Bowen*, 797 F.2d 391, 397-98 (7th Cir. 1986) (Medicaid Action Transmittal); *Thorson* v. *Gemini, Inc.*, 123 F.3d 1140, 1141 (8th Cir. 1997) (Secretary of Labor's opinion letters); *Sierra Club* v. *Babbitt*, 65 F.3d 1502, 1509 (9th Cir. 1995) (Regional Solicitor of Interior's opinion); *Herman* v. *Nationsbank Trust Co.*, 126 F.3d 1354, 1363 (11th Cir. 1997) (Secretary of Labor's opinion letters); *Tax Analysts* v. *IRS*, 117 F.3d 607, 613 (D.C. Cir. 1997) (IRS interpretation of statute stated in legal brief defending denial of FOIA request); *Health Ins. Ass'n* v. *Shalala*, 23 F.3d 412, 424 & n.8 (D.C. Cir. 1994) (Medicare interpretive rules).

Tenth Circuit's ruling determines ownership of gas worth billions of dollars; disrupts production and investment in an important national energy resource by creating title and investment uncertainty; causes severe financial hardship borne not just by large oil and gas companies but by small producers and individuals; and creates legal uncertainty in the taxation of CBM production.

The issue of law decided by the Tenth Circuit affects ownership of natural gas in more than 20 million acres of land (predominantly but not exclusively in the West) patented under the 1909, 1910, and 1914 Acts.[13] Because of acreage limitations in the nonmineral land laws under which coal lands were entered, the number of property holders affected is vast. At least 128,500 patents have been issued under the three Acts, and property rights in those patents have been fractionated over the years by intergenerational and other transfers.

Lands patented under these Acts fall within the most critical areas for CBM exploration and development in the country—among them the San Juan, Powder River, Uintah, Green River, Piceance, and Black Warrior basins. See App. 181a (Map); cf. Fassett, *supra*, at 134-44. CBM is one of the nation's most important emerging energy resources. Even at this early stage of its development, CBM represents more than 5% of the nation's proved gas reserves and almost 15% of potential reserves (about as much as Outer Continental Shelf reserves). See Richard A. Schraufnagel & Paul S. Schafer, *The Success of Coalbed Methane, in A Guide to Coalbed Methane*

[13] The 1914 Act reserved "gas" to the United States in patented lands classified as valuable for that mineral. 30 U.S.C. § 121. If CBM is "coal" and not "gas," then it would belong to the 1914 Act patentee (unless the 1909 or 1910 Act also applied) and no longer to the United States or its successor as owner of the gas estate. Of the more than 20 million acres affected, 16.25 million acres have been patented under the 1909 and 1910 Acts, and another 4.35 million acres under the 1914 Act. *Public Lands Statistics* 55 (1997).

Reservoir Engineering 1.1 (1995); Potential Gas Committee, Colorado School of Mines, *Potential Supply of Natural Gas in the United States* 11, 13 (1997). CBM production skyrocketed after the 1981 Solicitor's opinion seemingly settled the issue of title; the number of producing CBM wells grew from 515 in 1987 to 6300 in 1994. Schraufnagel & Schafer, *supra*, at 1.1-1.2.

The Tenth Circuit ruling put this industry in immediate jeopardy. Because coalbed gas is produced under oil and gas leases secured from the owner of the gas estate, not the coal estate, gas producers were subject to claims of trespass throughout the country, and royalty owners to claims of conversion of property belonging to the United States or its successors in interest. Coalbed gas revenues were placed in escrow, inflicting immediate hardship on royalty owners and small, highly leveraged producers. Multimillion-dollar investment deals were suspended. The disruption provoked Congress, within three months of the judgment below, to pass a law intended to afford parties to existing leases the limited relief that the United States, where it still owned the coal, would forbear from bringing claims against them asserting infringement of federal ownership rights. P.L. No. 105-367, § 1(a) & (b)(3), 112 Stat. 3313 (1998) ("Enzi Act").[14]

Although it is doubtful whether the Enzi Act provides even the limited security intended,[15] it does not address

[14] Separate provisions of the Enzi Act expressly limit its reach. The Act specifically provides that the United States does not waive any rights with respect to coalbed methane production unless it is from lands subject to a valid contract or lease in effect as of the date of enactment or by a landowner who has filed for a permit on or before that date to drill a well to a completion target in a coal formation. P.L. No. 105-367, § 1(a) & (b)(5). The Act also does not apply to interests in coal transferred to a federally recognized Indian tribe, as here, or to any third party by deed, patent, or other conveyance. *Id.* § 1(b)(3)-(b)(4).

[15] For example, the Act provides no protection against claims by persons other than the United States (such as federal coal lessees),

the fundamental question decided by the Tenth Circuit: title to natural gas worth billions of dollars.[16] No cloud on title of property interests that are this vast can be tolerated because of its inherent impairment of the alienability of so much property. The title uncertainty created by the ruling below is particularly detrimental because it will, if unresolved, retard CBM gas development for years to come. Even if the Enzi Act is construed generously, Congress expressly disclaimed any protection for landowners in the substantial tracts of unleased lands covered by the 1909, 1910, and 1914 Acts; indeed, the Wyoming producers who sought and obtained passage of the Enzi Act have estimated that it affects only about 5% of the lands patented under the three Acts. Unleased lands are critical because of the dynamism of the CBM industry; for example, after the unexpected success of shallow-coal drilling in the Powder River Basin, lands once considered of marginal or no value are now in demand for development. Even so, few producers will pay the substantial lease bonuses typically needed to secure a lease, much less commence production, when title is uncertain. There will be a multiplier effect on lands adjacent to those covered by the 1909, 1910, and 1914 Acts, because often these lands must be developed on an integrated basis to be commercially viable. In important basins that are par-

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and has uncertain application to existing oil-and-gas leases that do not specifically "convey[] rights to explore for, extract, and sell coalbed methane," P.L. No. 105-367 § 1(a)(1)(B). The expected source for guidance on the meaning of the Enzi Act is an opinion of the Solicitor of Interior, but ironically under the Tenth Circuit's *Chevron* ruling any such opinion would not be entitled to deference and could not be relied upon by private parties.

[16] The Tribe has valued its claims just for the 200,000 acres at issue in this case at $1 billion. David Statts, *Tribe Wins Again in Coal-bed Gas Case*, The Durango Herald, July 21, 1998, at 1A. Amoco alone has invested more than $500 million in lease bonuses, exploration, wells, pipelines, processing plants, and other facilities just on the Tribe's reservation.

tially or largely unleased—among them the Powder River, Green River, Piceance, Raton, and Uintah basins—lands that otherwise would be brought into production will be left idle by the Tenth Circuit's decision.

The Tenth Circuit's reversal of the summary judgment entered by the district court also inflicts significant financial hardship on the approximately three thousand farmers and other royalty owners who are named or unnamed class defendants (as well as curtailing production on contested lands). Most royalty payments from contested lands have been escrowed since the panel decision; royalty owners who have leases with Amoco have alone been deprived of access to millions of dollars in escrowed royalties in little over a year. Many royalty owners are elderly and have fixed incomes or small farms, and often are children or grandchildren of the original patentees. They count on royalty income to support them in retirement or to pay for college tuitions or notes on their farm. Electa Draper, *Utes Celebrate Natural-Gas Decision*, Denver Post, July 22, 1998, at 18A. Some landowners in the class have had to sell their farms (or return farm equipment to dealers) because of lack of cash.

Finally, the ruling below creates turmoil in federal, state, and local taxation. In 1980, Congress passed a law providing a tax credit to encourage development of otherwise uneconomic domestic fuel resources. 26 U.S.C. § 29. Participants in San Juan basin development alone have claimed credits worth hundreds of millions of dollars from 1909 and 1910 Act lands; the ruling below raises significant uncertainty as to whether taxpayers throughout the country (including numerous public investors in financial trusts to which such credits were effectively transferred) were entitled to the credits claimed. In addition, even though CBM wells were drilled in reliance on the availability of those credits for CBM pro-

duced through the year 2002, cf. Fassett, *supra*, at 144 (tax credits key to economic viability of CBM wells), the entitlement of taxpayers to those future credits is now in jeopardy.

On the state and local level, the decision threatens dislocation in property, income, sales, and severance tax regimes; different tax regimes apply to coal versus gas, and the taxing entity may not have jurisdiction over a new CBM owner (like the Tribe). This impact will be especially severe in localities like La Plata County, Colorado that derive substantial portions of their tax base from CBM production and will be forced to cut essential services. See Electa Draper, *Utes Irked by County's D.C. Lobbying*, Denver Post, Oct. 5, 1998, at B04.

In summary, the court of appeals, by indefensible statutory analysis and improper disregard of an agency interpretation entitled to deference, has created widespread dislocation in an area where reliance interests are at a premium, necessitating immediate review by this Court.

CONCLUSION

The Court should grant this petition for certiorari.

Respectfully submitted,

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APPENDICES

APPENDIX A

UNITED STATES COURT OF APPEALS
TENTH CIRCUIT

No. 94-1579

SOUTHERN UTE INDIAN TRIBE,
Plaintiff-Appellant,

v.

AMOCO PRODUCTION COMPANY; SHIRLEY K. ADAMS; HENRY ASHWORTH; CARLA M. ASPAAS; ERIC K. ASPAAS; HELEN RUTH ASPAAS; LAURA BELLE ASPAAS; LETA M. ADKINS; RITA M. ADKINS; MAXWELL C. ANDERSON; EARL A. BARKER; MAURICE C. BREEN, named as: Heirs of Maurice C. Breen, deceased; HORACE F. BUCHANAN, named as: the Heirs of Horace Buchanan, deceased; GEORGE A. BUGG; CARBONE INVESTMENT COMPANY; JACK CARMACK; ROWLAND CARMACK; JOSEPH C. CIANCIO; WILLIAM KEMP CLARK; COLORADO NATIONAL BANK, George Veto Trust; COLORADO NATIONAL BANK OF LONGMONT, conservator Gladys N. Frazzini; DOROTHY A. CORGIN; KELLY COX, named as: the Heirs of Kelly Cox, deceased; A.B. CROSBY; BARBARA CROSBY; DAVID CROSBY; JOHN CROW, JR.; MARGARET CROW; MANUEL CRUZ; LOUIS M. CUMMINS; FREDERICK E. DICKERSON; J.M. EAKES; ROBERT MCFERRAN EAKES; MARGARET ELLISON; SALLY M. ETTERBECK; MINNIE FLAKS; TILLIE FLAKS; CASSIO FRAZZINI; ADELE FROST; ROBERT GALBASIN; ABEL S. GALLEGOS; MONTEY GARNAND; RUBY GIBBS GOGGANS; CHRISTINE HAMILTON; HARDIN SIMMONS UNIVERSITY; H.A. HARMON, named as: the Heirs of H.A. Harmon, deceased; HONDO OIL & GAS COMPANY, named as: the shareholders of Hondo Oil & Gas Company (dissolved);

HYDE OIL AND GAS CORPORATION; CHARLES KETTERING; FIDEL LUCERO; RICHARD C. MALCOMB; SUZANNE HEATH MANGES; CATHERINE B. MCELVAIN; MABEL MCELVAIN; THORNTON H. MCELVAIN, JR.; DOROTHY N. MCKELVEY; EDWIN L. MCKELVEY; R. FRANKLIN MCKELVEY; W.R. MCMAHON; MCMURRY OIL COMPANY; W. CLAY MEREDITH CHARITABLE TRUST; W.A. MONCRIEF, named as: the Heirs of W.A. Moncrief, deceased; ROY E. MONTGOMERY, personal representative for the Estate of W. Clay Meredith, deceased; FORREST D. MILLER, named as: the Heirs of Forrest D. Miller, deceased; HELEN L. MILLER, named as: the Heirs of Helen L. Miller, deceased; THOMAS S. MORRISSEY; THOMAS J. MORRISSEY; EMIL MOSBACHER; EMIL MOSBACHER, III; JOHN DAVID MOSBACHER; R. BRUCE MOSBACHER; MYRA THERESA MOULDS; NORTH CENTRAL OIL CORPORATION; H.L. OLIVER; CLARA ONOFRIO; MARGARET C. PARGIN; HAROLD F. PAYNE, JR.; NEVILLE G. PENROSE; BEN M. PETERSON, JR.; FREDERICK PETROCCO; PHILLIPS PETROLEUM COMPANY; JAMES M. RAYMOND; W.E. RENNIE, named as: the Heirs of W.E. Rennie, deceased; THOMAS C. ROMOLO; BENTON E. SMULLYEN; CLINTON I. SMULLYEN; WILLIAM STERLING; J.L. TATUM, named as: the Heirs of J.L. Tatum, deceased; ANNA CARLEO TOMEO; ERNEST TOMEO; TURNER SECURITIES; RICHARD W. TURNER, SR.; GEORGE C. VANCE, named as: the Heirs of George C. Vance, deceased; ANTHONY H. VETO; JOSEPH F. WARE, JR.; ALBERT E. ZARLENGO; ANTHONY F. ZARLENGO, John Doe and all other unknown persons claiming an interest in the mineral estate located within the N/2 of section 12, T33N, R8W, N.M.P.M., La Plata County, Colorado; AMAX OIL & GAS, INC.; BOWEN/EDWARDS ASSOCIATES, INC.; FUEL RESOURCES DEVELOPMENT COMPANY; MCKENZIE METHANE CORPORATION; MERIDIAN OIL, INC.; MOBIL OIL CORPORATION; NATIONAL COOPERATIVE REFINERY ASSOCIATION; NORTHWEST PIPELINE CORPORATION; PABLO

OPERATING COMPANY; PALO/EAGLE JOINT VENTURES; RICHMOND PETROLEUM, INC.; WILLIAMS PRODUCTION COMPANY; MANUEL LUJAN, JR., Secretary of the United States Department of the Interior; DEPARTMENT OF INTERIOR, and its subordinate agencies; BUREAU OF INDIAN AFFAIRS; BUREAU OF LAND MANAGEMENT; MINERALS MANAGEMENT SERVICE; EDDIE F. BROWN, Assistant Secretary of the Bureau of Indian Affairs; CATHERINE FRANCES MCELVAIN HARVEY; DELOS CY JAMISON, Director of the Bureau of Land Management; and SCOTT S. SEWELL, Director of the Minerals Management Service; Class of Defendants situated similarly to those named non-governmental defendants who claim ownership of an interest in coalbed methane and other coal constituents or claim the right to explore for, develop or produce those substances from coal or coal strata reserved by the United States in patents issued under the Act of March 3, 1909, or the Act of June 22, 1910, for lands located within the exterior boundaries of the Southern Ute Indian Reservation and which class members have not obtained tribal consent to and federal approval of said interests of rights; JACK BALLE; J.M. HUBER CORPORATION, Oil & Gas Division; MARY JEAN BALLE; DONALD C. CIANCIO; SUSIE M. CIANCIO; NCNB TEXAS NATIONAL BANK, as Trustee of the Kelly Cox Testamentary Trust; ADDIE G. CROSBY; JACK W. CROSLAND, JR.; HENRY L. ENOCHSON; MARY JANE ENOCHSON; J.L. GOGGANS; LIBERTY TULSA, as trustee of the Christine J. Hamilton Trust; HELEN CROSLAND HENDRICKS; THOMAS L. JOHNSTONE; JAMES ERIC KAINDL; LARRY JAMES KAINDL; LISA JEAN KAINDL; JANE P. MOSBACHER, named as The Heirs of Jane P. Mosbacher, Deceased; PM ASSOCIATES, a Colorado general partnership; FIRST INTERSTATE BANK OF DENVER, as Co-trustee of the Estate of W.E. Rennie est W.E. Rennie; RODERICK L. TURNER; WELLS FARGO BANK, as trustee of the George C. Vance Trust; ALBERT E. ZARLENGO, JR., as trustee for the Albert E. Zarlengo Trust; BELL SOUTH CORPO-

RATION HEALTH CARE TRUST; J. MAGNESS, INC.; SG INTERESTS I, LTD; MOSBACHER U.S.A., INC.; LAND OWNERS COALSEAM COMMITTEE,

Defendants-Appellees,

and

MERIDIAN OIL, INC; PABLO OPERATING COMPANY; TIFFANY GAS COMPANY, UNION TEXAS PETROLEUM CORPORATION, John Doe oil company and all other unknown persons or entities claiming leasehold working interests or operating rights to explore for, produce or develop coalbed methane or coal constituents from coal or coal strata reserved by the United States in patents issued under The Act of June 22, 1910, for lands located within the exterior boundaries of the Southern Ute Indian Reservations, and which entities have not obtained tribal consent to and federal approval of said exploration, production of development activities,

Defendants.

INDEPENDENT PETROLEUM ASSOCIATION OF MOUNTAIN STATES; LA PLATA COUNTY, BOARD OF COUNTY COMMISSIONES; LA PLATA COUNTY CATTLEMEN'S ASSOCIATON; NATIONAL ASSOCIATION OF ROYALTY OWNERS; CAMPBELL COUNTY WYOMING MINERAL OWNERS, IGNACIO SCHOOL DISTRICT 11 JT; BAYFIELD SCHOOL DISTRICT 10 JT-R,

Amici Curiae.

Appeal from the United States District Court
for the District Court of Colorado
D.C. No. 91-B-2273

OPINION ON REHEARING EN BANC

Before SEYMOUR, Chief Judge, PORFILIO, ANDERSON, TACHA, BALDOCK, KELLY, HENRY, and BRISCOE, Circuit Judges, and McKAY, Senior Circuit Judge.*

SEYMOUR, Chief Judge.

This case arose from the relatively recent development of technology that has made coal bed methane (CBM) commercially valuable. The Southern Ute Indian Tribe (the Tribe) appealed the district court's grant of summary judgment to defendants Amoco Production Company and others on the Tribe's claim to ownership of coal bed methane contained in coal acquired by the Tribe as successor in interest to a statutory reservation of coal to the United States. The Tribe also appealed the district court's grant of summary judgment to the Secretary of the Interior, the Department of the Interior, and the Department of the Interior's subordinate agencies (the federal defendants) on the Tribe's claim of breach of fiduciary duty. A panel of this court reversed the district court on the issue of CBM ownership and remanded for further proceedings consistent with its decision. *See Southern Ute Indian Tribe v. Amoco Prod. Co.*, 119 F.3d 816 (10 Cir. 1997). Amoco requested rehearing en banc which we granted in part as set out below.

I.

In 1991, the Tribe brought suit against Amoco Production Company, other oil companies, and individual oil and gas lessees and lessors (the Amoco defendants) who asserted ownership interests in CBM contained in coal owned by the Tribe. In its First Amended Complaint, the Tribe claimed ownership of CBM and asserted that various Amoco defendants, by exploring for and

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* Judge Wade Brorby, Judge David M. Ebel, Judge Carlos F. Lucero, and Judge Michael R. Murphy are recused in this case.

extracting CBM under oil and gas leases, had among other things: 1) trespassed on Tribal lands; 2) trespassed on Tribal coal; 3) converted Tribal coal; 4) failed to pay severance tax to the Tribe; and 5) in collusion with State of Colorado officials, deprived the Tribe of federally guaranteed rights in violation of 42 U.S.C. § 1983. The Tribe sought a variety of remedies including: 1) a declaratory judgment vesting in the Tribe ownership of CBM and other substances contained in Tribal coal; 2) declaratory judgment that Tribal consent is required for CBM extraction; 3) an order quieting title to CBM in the Tribe; 4) injunctive relief to prevent continued exploration and production of CBM without Tribal consent; 5) damages for present and future injuries to coal, for extraction of CBM, for conversion of coal, for civil rights violations, and for failure to pay severance taxes; 6) title to all exploration and production facilities on Tribal lands which, if removed, would interrupt production of CBM; and 7) costs and attorney's fees.

The Tribe also sued the federal defendants in their capacities as trustees for the Tribe. The Tribe claimed that the federal defendants breached their fiduciary duties to the Tribe by allowing exploration and extraction of CBM under oil and gas leases. The Tribe sought a declaratory judgment on the breach of fiduciary duty issue, and sought injunctive relief to prevent the federal defendants from issuing permits to explore for and extract CBM under oil and gas leases or from otherwise acquiescing in the derogation of the Tribe's alleged ownership interest in CBM.

Two issues were identified as fundamental to the resolution of all claims against the Amoco defendants: 1) the determination of CBM ownership, and 2) the existence of and applicability of defenses based on acts or omissions of the Tribe. Since resolution of either issue in favor of the Amoco defendants would settle all claims, the district court granted a joint motion by the Tribe

and Amoco to bifurcate these issues. The parties then moved to certify "a defendant class comprised of all persons, except the Tribe and governmental entities, who claim an ownership interest in the coalbed methane" for the purposes of resolving the bifurcated issues. Aplt.'s App., vol. I at 214. Amoco was designated as representative of the class and, in that capacity, brought a motion for summary judgment on the bifurcated issues. *Id.*, vol. II at 353.

The federal defendants supported the Amoco defendants' claim of ownership of CBM and asserted accordingly that they had no fiduciary duty to manage an asset for the Tribe which it did not own. The federal defendants filed a motion for summary judgment based on the Tribe's nonownership of the CBM. In the alternative, they moved to dismiss the Tribe's action as time-barred. *Id.* at 365. The Tribe brought a cross-motion for summary judgment on the issue of CBM ownership.

The district court held that CBM ownership was vested unambiguously in the Amoco defendants. *Southern Ute Indian Tribe v. Amoco Prod. Co.*, 874 F. Supp. 1142, 1160 (D. Colo. 1995). Consequently, the court concluded it "need not address further the application of the common defenses to the ownership question," *id.* at 1160, or reach the federal defendants' claims that the Tribe's action was barred by the statute of limitations, *id.* at 1161. It then granted summary judgment to the Amoco defendants on the issue of CBM ownership, and to the federal defendants on the "issue of breach of fiduciary duty for failure to manage the CBM gas," leaving for later determination other issues concerning fiduciary duty. *Id.* The court denied the Tribe's motion for summary judgment. *Id.*[1]

On appeal, the panel concluded in Part II A that the Coal Land Acts of 1909 and 1910, which reserved coal

[1] The district court certified its judgment for immediate appeal under Fed. R. Civ. P. 54(b).

to the United States, do not by their plain language reveal congressional intent with respect to CBM. *See Southern Ute*, 119 F.3d at 821-22. The panel held in Part II B that the Acts, viewed in historical perspective, are ambiguous regarding Congress' specific intent to include or exclude CBM in the reservation of coal. *Id.* at 822-24. Finally, in Part II C the panel addressed general congressional intent and was persuaded that Congress neither unambiguously included or excluded coal bed methane when it reserved the coal to the United States. In light of the Acts' historical context and the absence of a clear conveyance of CBM to the surface patentees, coupled with the principle of statutory construction that resolves ambiguity in favor of the sovereign, the panel concluded that CBM was reserved to the United States along with the coal. *Id.* at 826. In Part II D the panel addressed and rejected defendants' contention that deference was due to a contrary opinion issued by the Solicitor of the Department of the Interior in 1981 entitled *Ownership of and Right to Extract Coalbed Methane Gas in Federal Coal Deposits*, 88 Interior Dec. 538 (1981). The panel held that deference was not appropriate under either *Chevron, U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984), or *Skidmore v. Swift & Co.*, 323 U.S. 134 (1944). *See Southern Ute*, 119 F.3d at 829-36. Finally, in Part III, the panel pointed out that, in light of its reversal, further proceedings would be required on the resolution of important issues concerning the class action defenses to the Tribe's ownership of CBM which the district court held were mooted by its decision in favor of the Amoco defendants. *Id.* at 836.

Amoco petitioned for rehearing en banc. We granted rehearing limited to the issue of whether "coal" as used in the Coal Land Acts of 1909 and 1910 unambiguously excludes or includes CBM.[2] We now hold, in accordance

[2] The federal defendants did not petition for rehearing en banc. Nevertheless, they filed a supplemental brief on rehearing which clarified their position as follows:

with the panel opinion, that those statutes are ambiguous. Under the long-standing principle that property grants are construed favorably to the sovereign, we conclude the reservation of coal to the United States in the 1909 and 1910 Acts must be construed to include the ownership of CBM. In so holding, we adopt Parts II A, B, and C of the panel opinion in substantial part as modified below. The question of deference to the 1981 Solicitor's opinion

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In the proceedings before the panel in this case, the federal appellees' brief primarily addressed specific federal defenses relating to the Tribe's breach of trust claim. See Brief for the Federal Appellees 28-45. On the question of whether the Coal Land Acts of 1909 and 1910 reserved CBM, the federal appellees adopted the answer brief filed by Amoco Production Company. See *id.* at 28, 30. The brief of Amoco Production Company specifically contended, among other arguments, that the term "coal" is not ambiguous and means "the solid rock." Brief for Amoco Production Co., at 12-26. We submit this response to clarify the federal appellees' position in two respects.

First, although the federal appellees endorsed the arguments set out in the Amoco Production Company's brief, that endorsement does not signify a view that the question of CBM ownership should necessarily be resolved merely by reference to the meaning of the term "coal." Rather, the federal appellees' view on the ultimate issue of CBM ownership rested on the analysis set forth in the May 12, 1981, opinion of the Solicitor of the Interior, which concluded, for the reasons stated therein, that the Coal Land Acts of 1909 and 1910 did not reserve CBM. See *Ownership of and Right to Extract Coalbed Gas in Federal Coal Deposits*, 88 I.D. 538 (1981). The panel decision of this Court considered and rejected the Solicitor's analysis. See 119 F.3d at 834-836.

Second, the panel decision of the court has prompted the Solicitor of the Interior to commence a review of the analysis set out in the May 12, 1981, Solicitor's opinion. See, *e.g.*, *Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 863-864 (1984) (noting that an agency "must consider varying interpretations and the wisdom of its policy on a continuing basis"). That review is ongoing and could conceivably result in a modification of the views expressed therein. Response for Federal Aplees at 3-4.

was not reconsidered by the en banc court and we therefore do not disturb the panel's disposition of that issue in Part II D of its opinion.

II.

The single issue which is determinative of this appeal is whether the Tribe, as successor in interest to a statutory reservation of coal to the United States made in the coal lands acts of 1909 and 1910, is also the owner of CBM, a gaseous substance contained in coal. "We review a grant of summary judgment de novo, applying the same legal standard used by the district court under Fed.R. Civ.P. 56(c)." *Utah v. Babbitt*, 53 F.3d 1145, 1148 (10th Cir. 1995). Summary judgment is appropriate if there are no genuine issues of material fact, and the moving party is due judgment as a matter of law. *Id.* We construe the facts and record in the light most favorable to the party opposing the motion. *Id.* "We also review de novo the district court's interpretation of a federal statute." *Id.*; *see also Pittsburg & Midway Coal Mining Co. v. Yazzie*, 909 F.2d 1387, 1393 (10th Cir. 1990).

Determination of CBM ownership where the Tribe has acquired its coal via a statutory reservation to the United States presents a question of statutory interpretation. The purpose of statutory construction is to determine congressional intent. *Griffin v. Oceanic Contractors, Inc.*, 458 U.S. 564, 570 (1982) ("Our task is to give effect to the will of Congress . . . ."). We must decide whether Congress intended to reserve CBM to the United States (and thus to the Tribe as its successor in interest) as part of the coal reservations in the 1909 and 1910 Acts, or whether Congress intended that CBM be treated as part of the unreserved estate (belonging to the Amoco defendants' predecessors in interest).

Of critical importance is the long recognized principle of statutory construction, applicable here, that "ambiguity

or uncertainty in the terms employed [in land grants] should be resolved in favor of the government." *Burke v. Southern Pac. R.R. Co.*, 234 U.S. 669, 680 (1914). It is an " 'established rule that land grants are construed favorably to the Government, that *nothing passes except what is conveyed in clear language*, and that if there are doubts they are resolved for the Government, not against it.' " *Watt v. Western Nuclear, Inc.*, 462 U.S. 36, 59 (1983) (quoting *United States v. Union Pac. R.R. Co.*, 353 U.S. 112, 116 (1957)) (emphasis added) (concluding that gravel is included in mineral reservation to the United States). The burden remains on defendants to dispel any ambiguity in the construction of the coal reservation.

A. Plain Meaning of the Statutes

"In ascertaining the plain meaning of [a] statute, the court must look to the particular statutory language at issue, as well as the language and design of the statute as a whole." *K Mart Corp. v. Cartier, Inc.*, 486 U.S. 281, 291 (1988). "In interpreting statutes, we begin with the relevant language." *Aulston v. United States*, 915 F.2d 584, 589 (10th Cir. 1990). Where the will of Congress "has been expressed in reasonably plain terms, 'that language must ordinarily be regarded as conclusive.' " *Griffin*, 458 U.S. at 570 (quoting *Consumer Prod. Safety Comm'n v. GTE Sylvania, Inc.*, 447 U.S. 102, 108 (1980)).

The relevant part of the 1909 Act states that "any person who has in good faith located, selected, or entered under the *nonmineral* land laws of the United States any lands which subsequently are *classified . . . as being valuable for coal, may* . . . upon making satisfactory proof of compliance with the laws under which such lands are claimed, receive a patent therefor, *which shall contain a reservation to the United States of all coal in said lands, and the right to prospect for, mine, and remove the*

same." Law of Mar. 3, 1909, ch. 270, 35 Stat. 844 (current version at 30 U.S.C. § 81) (emphasis added) (hereinafter the 1909 Act).[3] The 1910 Act similarly states that prospective homesteaders on coal lands may obtain a patent which "shall contain a reservation to the United States of all the coal in the lands so patented, together

[3] In full, the Act as originally titled and promulgated was as follows:

> Chap. 270.—An Act For the protection of the surface rights of entrymen.
>
> *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That any person who has in good faith located, selected, or entered under the nonmineral land laws of the United States any lands which subsequently are classified, claimed, or reported as being valuable for coal, may, if he shall so elect, and upon making satisfactory proof of compliance with the laws under which such lands are claimed, receive a patent therefor, which shall contain a reservation to the United States of all coal in said lands, and the right to prospect for, mine, and remove the same. The coal deposits in such lands shall be subject to disposal by the United States in accordance with the provisions of the coal-land laws in force at the time of such disposal, but no person shall enter upon said lands to prospect for, or mine and remove coal therefrom, without previous consent of the owner under such patent, except upon such conditions as to security for and payment of all damages to such owner caused thereby as may be determined by a court of competent jurisdiction: *Provided,* That the owner under such patent shall have the right to mine coal for use on the land for domestic purposes prior to the disposal by the United States of the coal deposit: *Provided further,* That nothing herein contained shall be held to affect or abridge the right of any locator, selector, or entryman to a hearing for the purpose of determining the character of the land located, selected, or entered by him. Such locator, selector, or entryman who has heretofore made or shall hereafter make final proof showing good faith and satisfactory compliance with the law under which his land is claimed shall be entitled to a patent without reservation unless at the time of such final proof and entry it shall be shown that the land is chiefly valuable for coal.
>
> Law of Mar. 3, 1909, ch. 270, 35 Stat. 844 (current version at 30 U.S.C. § 81).

with the right to prospect for, mine, and remove the same." Law of June 22, 1910, ch. 318, § 3, 36 Stat. 584 (current version at 30 U.S.C. § 85) (hereinafter the 1910 Act).[4]

[4] The 1910 Act, as originally titled and enacted, provided in relevant part:

> CHAP. 318.—An Act To provide for agricultural entries on coal lands.
>
> *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That from and after the passage of this Act unreserved public lands of the United States exclusive of Alaska which have been withdrawn or classified as coal lands, or are valuable for coal, shall be subject to appropriate entry under the homestead laws by actual settlers only . . . with a reservation to the United States of the coal in such lands and of the right to prospect for, mine, and remove the same. . . .[A]ll homestead entries made hereunder shall be subject to the conditions, as to residence and cultivation, of entries under the Act approved February nineteenth, nineteen hundred and nine, entitled "An Act to provide for an enlarged homestead:" *Provided,* That those who have initiated non-mineral entries, selections, or locations in good faith, prior to the passage of this Act, on lands withdrawn or classified as coal lands may perfect the same under the provisions of the laws under which said entities were made, but shall receive the limited patent provided for in this Act.
>
> . . . .
>
> SEC. 3. That upon satisfactory proof of full compliance with the provisions of the laws under which entry is made, and of this Act, the entryman shall be entitled to a patent to the land entered by him, which patent shall contain a reservation to the United States of all the coal in the lands so patented, together with the right to prospect for, mine, and remove the same. The coal deposits in such lands shall be subject to disposal by the United States in accordance with the provisions of the coal-land laws in force at the time of such disposal. Any person qualified to acquire coal deposits or the right to mine and remove the coal under the laws of the United States shall have the right, at all times, to enter upon the lands selected, entered, or patented, as provided by this Act, for the purpose of prospecting for coal thereon upon the approval by the Secretary of the Interior of a bond or undertaking to be filed with him as security for the payment of all damages to the crops

The Acts neither define coal nor mention CBM; thus, the statutes do not by their plain language indicate congressional intent regarding CBM. Even in the absence of a plain articulation, however, we have other means available to evaluate congressional intent. *See generally INS v. Cardoza-Fonseca*, 480 U.S. 421, 431-48 (1987). Following this circuit's traditional approach as developed in *Northern Natural Gas Co. v. Grounds*, 441 F.2d 704 (10th Cir. 1971), and followed in *Aulston*, 915 F.2d at 589-599, we use traditional tools of statutory construction to investigate whether inclusion of CBM in the coal reservation was either specifically intended by Congress, or is consistent with Congress' general legislative purpose in enacting the 1909 and 1910 Acts.

B. Specific Congressional Intent

Congress' specific intent to include or exclude CBM in its reservation of coal *must be judged from the perspective of Congress at the time of enactment of the 1909*

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and improvements on such lands by reason of such prospecting. Any person who has acquired from the United States the coal deposits in any such land, or the right to mine or remove the same, may reenter and occupy so much of the surface thereof as may be required for all purposes reasonably incident to the mining and removal of the coal therefrom, and mine and remove the coal, upon payment of the damages caused thereby to the owner thereof, or upon giving a good and sufficient bond or undertaking in an action instituted in any competent court to ascertain and fix said damages: *Provided*, That the owner under such limited patent shall have the right to mine coal for use upon the land for domestic purposes at any time prior to the disposal by the United States of the coal deposits; *Provided further*, That nothing herein contained shall be held to deny or abridge the right to present and have prompt consideration of applications to locate, enter, or select, under the land laws of the United States, lands which have been classified as coal lands with a view of disproving such classification and securing a patent without reservation.

Law of June 22, 1910, ch. 318, §§ 1, 3, 36 Stat. 583-84 (current version at 30 U.S.C. §§ 83, 85).

and 1910 Acts. The Amoco defendants and the dissent contend we can easily discern Congress' specific intent from that perspective. First, citing many contemporaneous dictionary definitions of coal, they argue that in 1909 coal was typically defined as a solid rock, without specific mention of gaseous constituents. Second, they contend that in 1909 Congress was aware of CBM as a hazardous gaseous byproduct of coal and could specifically have retained the CBM by inserting the word "gas" in the mineral reservation had it so wished. From these facts defendants and the dissent conclude that Congress' use of the word "coal" in its mineral reservation was not inadvertent, and that Congress specifically chose to reserve only solid rock coal. We disagree with Amoco and the dissent for a number of reasons.

First, Amoco and the dissent focus solely on the word "coal" and totally ignore what is apparent from the face of the statutes: the coal was reserved from patents issued to land claimants under land grants of "non-mineral" lands to homesteaders; the lands had been "classified, claimed, or reported as being valuable for coal;" and the reservation of coal included "the right to prospect for, mine, and remove the same." *See* 1909 Act. *See also* 1910 Act. Statutes must be read in their entirety, with each term considered in light of its context and the purposes of the act. *See Gustafson v. Alloyd Co.*, 513 U.S. 561, 574-78 (1995).

As explained more fully below, "Congress' underlying purpose in severing the surface estate from the [coal] estate was to facilitate the concurrent development of both surface and subsurface resources." *Western Nuclear, Inc.*, 462 U.S. at 47 (construing Stock-Raising Homestead Act of 1916, which reserved to the government "all the coal and other minerals"). The public lands governed by the 1909 and 1910 Acts were lands identified by the government as primarily valuable for coal, not as primarily valuable for other minerals or for homesteading. *See generally id.* at 47-52. The text of each Act makes

clear that the coal was being reserved for subsequent mining and removal. Congress also plainly expected that these lands would be used by settlers for homesteading, with no apparent concern regarding future mining for other minerals. The title of the 1910 Act is particularly instructive in this regard: "An Act To provide for agricultural entries on coal lands." *See* n. 4 supra. *See also Western Nuclear, Inc.*, 462 U.S. at 53.

Second, while contemporaneous dictionary definitions of words in a statute are relevant, *see Smith v. United States*, 508 U.S. 223, 228-29 (1993), the existence of alternative dictionary definitions may themselves indicate that the statute is ambiguous, *see National R.R. Passenger Corp. v. Boston & Maine Corp.*, 503 U.S. 407, 418 (1992). Although as the dissent points out, "coal" was sometimes defined as a solid, combustible material, *see dissent* at 3, it was also defined much more broadly in many contemporaneous dictionaries and encyclopediae. For example, the NEW STANDARD DICTIONARY OF THE ENGLISH LANGUAGE 508 (1913 ed.) defined "coal" as:

> An amorphous substance derived from the vegetation of prehistoric ages, containing different hydrocarbons with sometimes free carbon and also complex substances carrying oxygen and nitrogen, found in beds or veins in the earth and used as fuel.

Methane was considered a hydrocarbon in 1909 and squarely falls within the description of coal components set forth in the foregoing definition of coal. *See* VI THE CENTURY DICTIONARY 3740 (1914) (methane a hydrocarbon with chemical formula of CH_4).

It was widely recognized in 1909 that coal contains gaseous constitutents:

> Hydrocarbons, such as petroleum, bitumen, paraffin, &c., are also found occasionally in coal . . . . Gases, consisting principally of light carburetted hydrogen or marsh gas [CBM], are often present in considerable quantity in coal, in a dissolved or occluded state . . . .

VI ENCYCLOPAEDIA BRITANNICA 575 (11th ed. 1910).[5] Because of its "amorphous" nature and "variable composition," coal "cannot be as strictly defined as a crystallized or definite mineral can." *Id.*; *accord* III AMERICANIZED ENCYCLOPAEDIA BRITANNICA 1643 (1890) (same definition of coal). These definitions of coal were consistent with earlier ones, which characterized "coal" as "embrac[ing] all classes of mineral fuel that will ignite and burn with flame or incandescent heat . . . . [of which] [t]he prominent varieties are denominated anthracite and bituminous coal." IV THE AMERICAN CYCLOPAEDIA: A POPULAR DICTIONARY OF GENERAL KNOWLEDGE 726 (Ripley and Dana eds., 1873). In bituminous coal "hydrogen is the predominating element, in its [coal's] gaseous or volatile constituents, though both oxygen and hydrogen are generally present in such coals in nearly equal parts." *Id.* (corresponding to methane's molecular identification as CH_4). Additionally,

> The combinations of carbon, hydrogen, oxygen, and nitrogen with earthy impurities, to which the term mineral fuel [coal] may be properly applied, are infinite, ranging through all the grades of coal, from the hard, dense anthracite to the asphaltic varieties, and from the solidified petroleum to the gaseous naphtha.

Id. The common understanding that coal was a heterogenous, complex substance counsels against acceptance of the limitations defendants and the dissent promote by their characterization of coal as simply "the solid rock."

Moreover, we are persuaded there was enough undisputed information about the unique nature of CBM

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[5] "Occluded" was defined contemporaneously as "To take in and retain; to absorb." WEBSTER'S REVISED UNABRIDGED DICTIONARY 994 (G & C Merriam Co., 1913 ed.).

itself to indicate that even if Congress intended to retain only solid rock coal, Congress in 1909 may have considered CBM to be part of that solid coal.[6] The broad contemporaneous definitions of coal quoted above showing that the reserved coal actually contained CBM in an occluded state support this conclusion. CBM is generated as part of the chemical and physical processes which convert carbon-rich sediments into solid coal (coalification). J. Hovey Kemp & Kurt M. Petersen, *Coal-Bed Gas Development in the San Juan Basin: A Primer for the Lawyer and Landman*, 1988 ROCKY MTN. ASS'N OF GEOLOGISTS 257, 259. It is trapped by adsorption[7] "on the internal surface of micropores," and as "free gas in cracks and fractures."[8] *Ownership of and Right to Extract Coalbed Gas in Federal Coal Deposits*, 88 Interior Dec. 538, 540 n.11 (1981) (quoting Deul, *Methane Drainage from Coal Beds, A Program of Applied Research*, 60 ROCKY MTN. COAL MINING INST. 13 (1964)).

Although CBM in a gaseous state can be produced from coal, prior to that production most CBM is not sufficiently like other natural gases[9] for us to conclude

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[6] Any modern-day dispute regarding the exact nature of CBM and whether it is a separate gas or is part of coal is irrelevant to our task, and we do not resolve that issue here. For a general discussion of the difficulty of deciding ownership of CBM even today, *see* Jeff L. Lewin et al., *Unlocking the Fire: A Proposal for Judicial or Legislative Determination of the Ownership of Coalbed Methane*, 94 WEST VA. L. REV. 563 (1992).

[7] Adsorption is "adhesion in an extremely thin layer of molecules . . . to the surfaces of solid bodies or liquids." MERRIAM WEBSTER'S COLLEGIATE DICTIONARY 16 (10th ed. 1993).

[8] At issue here is the ownership of CBM trapped in and produced from the coal reservoir. We do not address ownership of CBM that may have migrated away from the coal into adjacent non-coal strata. Determining the relative proportions of CBM produced from coal and non-coal strata is an issue which must be resolved on remand.

[9] A gas is "a fluid substance with the ability to expand indefinitely." THE RANDOM HOUSE WEBSTER'S COLLEGE DICTIONARY 550 (1995).

that Congress in 1909 unambiguously intended the owners of other natural gases to also own CBM associated with the reserved coal. The adsorbed component of CBM is molecularly attracted to coal and cannot be released without an alteration in the physical state of the coal. In fact, release of either adsorbed or fracture-trapped CBM requires production techniques which often cause significant damage to the coal.[10] CBM ownership, therefore, cannot be disposed of by the simple tautology that gas is gas and coal is coal.[11] We are concerned not with the physical state of the substance as gas at the surface as it is now produced by modern technology, but rather with its physical state prior to extraction, as trapped in coal and economically inseverable in 1909. Even assuming that Congress specifically intended to retain only solid rock coal, CBM is so intimately associated with coal that Congress in 1909 could certainly have considered it part of the solid rock.[12] Indeed, it seems to us quite unlikely that Congress, if it had considered the matter, would have

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[10] Adsorbed CBM, which comprises most of the "gas" within coal, can be economically produced only by techniques which artificially induce changes in the coal reservoir. *See, e.g.*, Lewin, *supra* note 4, at 573, 576-583 (discussing vertical-borehole-induced pressure changes, hydrofracturing, and horizontal drilling).

[11] The dissent claims the relationship between adsorbed CBM and coal in the ground is no different than that between a piece of paper and the table it is lying on. Dissent at 12. However, the piece of paper would not have to be destroyed in order to move the table to a usable position, unlike the CBM adsorbed in the coal in 1909; nor would the table have to be destroyed in order to take the paper off and preserve it, unlike the coal in 1909 with respect to the adsorbed CBM. The same is, of course, true with respect to the sponge and water analogy used by the dissent. *Id.* at 13.

[12] In fact, by 1909, scientists understood that gas within coal was a constituent of coal which was generated by the coalification process. *See* Rollin T. Chamberlin, *Notes on Explosive Mine Gases and Dust*, U.S. Geol. Surv. Bull. 383, H.R. Doc. No. 59-823, at 16 (1909) ("The ultimate source of the gases [within coal] . . . has arisen from the slow decomposition of organic matter as a by-product in the process which has converted vegetable humus into coal.").

reasoned, "We want the Government to hold on to the solid bituminous core of these coal deposits, but we make no claim to the thin layer of molecules of CBM which coats the surfaces."

In addition, we disagree that a specific intent to retain only solid rock coal was evinced by Congress' awareness that CBM was released as a hazardous byproduct of coal mining. CBM was not readily severable from coal in 1909 even though it is now "potentially severable" through application of advanced drilling and production technologies.[13] *See* Kemp & Petersen, *supra*, at 261 ("Due to technical advances and changes in the world energy supply, the recovery and utilization of coal-bed gas now appears to be more feasible."). It is not reasonable to impute to Congress a desire to retain only solid rock coal constituents and to convey gaseous coal constituents when CBM is an integral component of coal and in 1909 there appears to have been no technology by which a patent holder could extract and capture CBM from coal without

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13 Congress almost certainly knew in 1909 that gas could be extracted from coal. The coal degasification practiced in 1909 was, however, a different process than the CBM drilling at issue in this case. Coal degasification required mining and extraction of coal, which released some of the gas, then releasing the remaining gas by mechanically crushing the coal in an airtight receptacle, Chamberlin, *supra* note 9, at 17, or heating it, *id.* at 39; LARRY L. ANDERSON & DAVID A. TILLMAN, SYNTHETIC FUELS FROM COAL § 3.1.1, at 31 (1979). *Because these processes of degasification necessarily resulted in damage to or destruction of the coal, they could only be employed by the owner of the coal.* Accordingly, the value of the gas extracted necessarily belonged to the coal owner. CBM drilling, on the other hand, for the first time allows CBM to be released from coal and captured without bringing large volumes of coal to the surface. The technique is typically employed where the coal is deeply buried and thinly bedded and cannot be economically mined. The advent of the drilling technologies employed today to extract CBM while leaving most of the coal relatively undisturbed, *cf.* Lewin, *supra* note 4, at 593-597 (the primary concern with CBM drilling is *in situ* damage to coal reserves), creates an apparent conflict in ownership of CBM that did not exist in 1909 and 1910.

damaging or destroying the coal. Because no effective means existed in 1909 to remove adsorbed CBM leaving the coal behind, CBM physically trapped in coal was necessarily retained with the coal reservoir.

The fact that CBM could not be commercially extracted from coal in 1909 indicates to us it is inappropriate to conclude that Congress unambiguously intended a specific result one way or the other regarding CBM by its use of the word "coal." Rather, we conclude that where the commercial value of CBM was unappreciated at the time of the enactment, the text of these acts gives us no particular indication of Congress' *specific intent* with regard to that asset. *See United States v. Union Oil Co. of California*, 549 F.2d 1271, 1273 (9th Cir. 1977) ("Congress was not aware of geothermal power when it enacted the Stock-Raising Homestead Act in 1916; it had no specific intention either to reserve geothermal resources or to pass title to them."); *Northern Natural Gas*, 441 F.2d at 714-15 (no specific intent to exclude helium will be inferred where lessors neither knew of presence nor appreciated value of helium gas); *cf. Aulston*, 915 F.2d at 594, 599 (rejecting argument that use of "gas" in mineral reservation evinced a specific congressional intent to exclude carbon dioxide from a gas reservation, when inclusion comported with general intent of statute and value of carbon dioxide was not appreciated at time of mineral reservation).

The Amoco defendants and the dissent make much of the fact that split mineral estates were recognized and protected on private lands when Congress created the first split mineral estates on public lands by the 1909 Act. They rely on *Chartiers Block Coal Co. v. Mellon*, 25 A. 597 (Pa.1893), which held that the oil and gas owner is entitled to drill through coal owned by another to reach the underlying gas. Defendants and the dissent refuse to acknowledge, however, that ninety years later the Supreme Court of Pennsylvania, citing *Chartiers*, issued the

seminal decision on CBM ownership in *United States Steel Corp. v. Hoge*, 468 A.2d 1380 (Pa. 1983). In holding that the CBM present in coal belongs to the owner of the coal estate rather than to the surface owners who reserved the gas, the court in *Hoge* observed in relevant part as follows:

> Coalbed gas is always present in coal seams; its molecules are absorbed in micropores of coal, and even the smallest particle of coal always contains, and when exposed emits, some coalbed gas. Coal and coalbed gas are, nevertheless, separate physical entities.
>
> The gas which has commonly been referred to as "natural gas" is generally found in strata deeper than coal veins, though it shares many of the characteristics of coalbed gas. Both gases evolved, through natural processes, from carbonaceous material beneath the earth's surface, and both contain mixtures of various hydrocarbons, including methane, ethane, propane, butane, carbon dioxide, carbon monoxide, and hydrogen sulfide. Both are, as are all gases, migratory, thus being capable of escaping their natural habitats to enter other strata, and both are found in the same geographic areas of Pennsylvania. Due to its fugacious character, natural gas is capable, under certain circumstances, of commingling with coalbed gas in the upper strata.

Id. at 1382.

> Gas is a mineral, though not commonly spoken of as such, and while in place it is part of the property in which it is contained, as is the case with other minerals within the bounds of a freehold estate. Gas necessarily belongs to the owner in fee, so long as it remains part of the property; ownership in it will be lost only upon grant or upon the gas leaving the property through migration. . . .

> Thus, as a general rule, subterranean gas is owned by whoever has title to the property in which the gas is resting. When a landowner conveys a portion of his property, in this instance coal, to another, it cannot thereafter be said that the property conveyed remains as part of the former's land, since title to the severed property rests solely in the grantee. *In accordance with the foregoing principles governing gas ownership therefore, such gas as is present in coal must necessarily belong to the owner of the coal, so long as it remains within his property and subject to his exclusive dominion and control.* The landowner, of course, has title to the property surrounding the coal. and owns such of the coalbed gas as migrates into the surrounding property.

Id. at 1383 (citations omitted) (emphasis added).

> The owner of coal may, as may any property owner, exercise dominion over his property so as to maximize his right of enjoyment thereover, within bounds limiting impingement upon the rights of other property owners. Hence, the coal owner may mine his coal, extract the gas from it, or both. If he chooses to extract the gas, drilling as well as hydrofracturing are available means, so long as their utilization does not impinge upon the rights of owners of the surrounding property, since the damage to coal inflicted by these processes is within his dominion to inflict.

Id. at 1384 (citations omitted).[14] The majority of other states addressing the issue have also held that ownership of CBM is in the coal owner. *See NCNB Texas Nat'l Bank, N.A. v. West*, 631 So. 2d 212 (Ala. 1993) (coal owner owns CBM contained in coal, and gas owner owns

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[14] The opinion in *Hoge* is ample response to the dissent's assertion that it is illogical to distinguish in ownership between CBM adsorbed in coal and CBM that has migrated. *See* dissent at 9 (the only difference between "trapped" CBM and "escaped" CBM is "dumb luck").

CBM which has migrated away from the coal reservoir); *Vines v. McKenzie Methane Corp.*, 619 So. 2d 1305 (Ala. 1993) (ownership of CBM included in grant of "all coal"); *Rayburn v. USX Corp.*, No. 85-G-2661-W, 1987 U.S. Dist. LEXIS 6920 (N.D. Ala. Jul. 28, 1987) (coal owner, USX, is owner of right to explore for and to extract occluded CBM where grantor of deed retained only oil and gas rights). *But cf. Carbon County v. Union Reserve Coal Co.*, 898 P.2d 680 (Mont. 1995) (right to extract CBM is with holder of gas exploration rights).

In summary, given that CBM was not commercially severable in 1909 and thus had no value, and given the uncertainty that Congress would have viewed adsorbed CBM as a component distinct from solid rock coal, we cannot conclude that Congress formed a specific intent to convey CBM as a gas. As a consequence, we are persuaded that the 1909 and 1910 Acts are ambiguous with respect to Congress' specific intent regarding CBM. *Cf. Western Nuclear, Inc.*, 462 U.S. at 56 (noting that the term "mineral" is ambiguous with respect to congressional intent to reserve gravel as a mineral). In the absence of specific congressional intent, we look at the general purpose of the statute and the historical context in which it was enacted to determine whether we can discern general congressional intent. *Aulston*, 915 F.2d at 598. "General intent should be discovered . . . by considering the purposes of the grant in terms of enjoyment of the rights created." *Northern Natural Gas*, 441 F.2d at 714. "In our opinion general intent is closer to original intent than is specific intent which blossoms when a component previously regarded as an impurity becomes valuable." *Id.* at 715.

C. General Congressional Intent

"In interpreting the relevant [statutory] language . . . we look to the provisions of the whole law, and to its object and policy." *Aulston*, 915 F.2d at 589; *see also United States v. Colorado*, 990 F.2d 1565, 1575 (10th

Cir. 1993). "[W]e look at not only the statute itself but also at the larger statutory context. We may ascertain the intent of Congress through statutory language and legislative history." *Utah v. Babbitt*, 53 F.3d at 1148 (citations omitted).

1. History

To understand the general congressional intent behind the 1909 and 1910 Acts, we review the historical context in which they were enacted, including the history of the Southern Ute Tribe's acquisition of its reservation lands and the United States' reservation of the coal it ultimately conveyed to the Tribe. We begin in the latter half of the nineteenth century with the formation of the Southern Ute Indian Reservation.

The Ute Indian Reservation was established in 1864, when the Uncompahgre, White River and Southern Utes "exchanged their aboriginal lands in New Mexico, Utah, and Colorado for . . . approximately 15.7 million acres . . . within Colorado." *United States v. Southern Ute Tribe or Band of Indians*, 402 U.S. 159, 162 (1971). The reservation did not long remain intact. In 1874, 3.7 million acres of the reservation were ceded to the United States upon discovery of mineral resources on reservation land. *Id.* In 1880, the remaining reservation land was ceded to the United States in return for individual allotments and "shares in the proceeds of unallotted land sales." *Id.* at 164 (quoting *United States v. Southern Ute Tribe or Band of Indians*, 423 F.2d 346, 350 (Ct. Cl. 1970)). The Uncompahgre and White River Utes left the reservation before 1882. *Id.* at 162.

After the cession of reservation land, the United States opened the ceded, non-allotted reservation to homesteading and mineral exploration under the terms and conditions of a variety of federal statutes. *Amoco Prod. Co.*, 874 F. Supp. at 1148 (citing the Homestead Act of 1862, 43 U.S.C. §§ 161 *et seq.* (repealed 1976), the Coal

Lands Act of 1873, 17 Stat. 607, and the Mining Law of 1872, 30 U.S.C.A. § 22). At that time, "the disposition of land owned by the United States depended upon whether it was classified as mineral land or nonmineral land, and title to the entire land was disposed of on the basis of th[at] classification." *Western Nuclear, Inc.*, 462 U.S. at 47. Because the United States Geological Survey had insufficient resources to evaluate the mineral character of each land parcel before patent issuance, it often depended on the attestation of a patent applicant to determine the character of his land. *Id.* at 48 n.9. Although this honor system for patent evaluation inevitably led to considerable abuse, agricultural settlement and mineral exploration of reservation lands and other areas in the western United States proceeded for several decades under this system.

In 1906, President Roosevelt withdrew from homesteading or mineral patenting approximately 64 million acres considered to be valuable for coal resources, including the ceded, non-allotted Ute Reservation lands. *Id.* at 48-49 (citing 41 CONG. REC. 2615 (1907)). Two concerns drove the withdrawal of coal lands: first, the government wished to end the issuance of patents in reliance on an entrant's attestation of the mineral character of the land; and second, the government wished to encourage optimal land use by ensuring that lands valuable for mineral resources would not be held unavailable for mineral exploration by homesteading claims. *Id.* In his Sixth Annual Message to the nation, President Roosevelt explained that the withdrawal was necessary to preserve ownership of coal resources in the United States and to ensure price control of coal and disposition of the coal resources "under conditions which would inure to the benefit of the public as a whole." PRESIDENT THEODORE ROOSEVELT, SIXTH ANNUAL MESSAGE (Dec. 3, 1906), *reprinted in* XV THE WORKS OF THEODORE ROOSEVELT 363 (1926).

The 1906 withdrawal included lands on which the process of homesteading (holding the land for a term of years in agricultural use in return for a land patent) had begun. Homesteaders who had entered the land in good faith, believing the land to be of nonmineral character, were disenfranchised by the withdrawal. To remedy that disenfranchisement while preserving the value of coal for future use of the United States, Congress enacted the 1909 Act. That act permitted existing good faith agricultural entrants whose land had been subject to the 1906 withdrawal to receive patents for those lands subject only to a "reservation to the United States of all coal in said lands." 30 U.S.C. § 81. In 1910, Congress enacted a similar statute for the protection of prospective agricultural entrants to federal lands. Under the protection of these Acts, the Amoco defendants' predecessors in interest claimed patents to land subject only to the reservation of coal in the United States.

Homesteading and mineral exploration proceeded under these statutes until 1934, when Congress changed its policy toward Indian Tribes and passed the Indian Reorganization Act (IRA), 25 U.S.C. §§ 463-479, which restored to tribal ownership some lands previously taken by the federal government. Congress provided that "[t]he Secretary of the Interior, if he shall find it to be in the public interest, is authorized to restore to tribal ownership the remaining surplus lands of any Indian reservation opened before June 18, 1934," subject to any outstanding rights or claims. *Id.* § 463(a). In 1938, pursuant to the 1934 Act, equitable title to coal held by the federal government on the Southern Ute Reservation was returned to the Tribe, subject to outstanding homestead patents. *Amoco Prod. Co.*, 874 F. Supp. at 1151.

2. Analysis

With this background, we turn to the general intent behind the 1909 and 1910 Acts. Defendants argue and

the district court agreed, *id.* at 1155-59, that, in attempting to preserve coal lands for the benefit of the public as a whole and to remedy the negative impacts of the 1906 land withdrawals, Congress specifically considered and rejected a broad reservation of all minerals. From that rejection, defendants contend, we should infer that Congress knowingly chose the most narrow possible meaning of coal. Defendants rely on a passage of debate between a member of the House of Representatives from Texas and the Chairman of the Committee on Public Lands concerning the intended mineral reservation:

> Mr. STEPHENS of Texas. Could the gentleman better arrive at what he desires by only patenting the surface of the land and *reserving all minerals, precious and otherwise*?
>
> Mr. MONDELL. That has been discussed at some length, and *the Committee on Public Lands is not of the opinion that that ought to be done.* We believe this is quite a sufficient departure from the past practice of the Government. The lands which this legislation will affect are lands which the department has claimed contain some *coals* of value.

43 CONG. REC. 2504 (1909) (emphasis added). Even bearing in mind the admonition that legislative history should be treated cautiously, *Exxon Corp. v. Lujan,* 970 F.2d 757, 761 (10th Cir. 1992), it is clear that Congress recognized in 1909 it had the option to reserve "all minerals" and rejected that option.

Congress' rejection of an "all minerals" reservation, however, does not inform us about Congress' intent regarding the extent of the reservation of a single substance, "coal." Moreover, the quoted exchange between Representatives Stephens and Mondell does not bear the weight defendants would have us give it because the Committee affirmatively considered and rejected several other options,

including no reservation of coal. Aplt.'s App., vol VI at 1275, *Hearings on Coal Lands and Coal-Land Laws of the United States Before the House Committee on Public Lands,* 59th Cong., 2d. Sess. 17 (Dec. 17, 1906) (hereinafter *Hearings*) (statement of Edgar E. Clark) (considering the use of government-imposed railroad rates to retain control of coal supply). *The Committee also discussed and rejected the possibility of retaining only ownership of coal which was marketable in 1907.* Aplt.'s App., vol. VI at 1286, *Hearings,* at 15 (Jan. 9, 1907) (statement of Marius R. Campbell); *id.* at 1281 (noting that the western coals at issue in this case were not mineable at that time and were "inferior to the eastern coals, particularly from a steaming and coking standpoint").

Rather than adopt any of those options, Congress chose to reserve "all the coal." *Id.* at 1287 (The "only really effective way to retain the balance of the coal in the public domain in public ownership . . . [was to] reserve the coal under the surface of all of the land. That would effectively retain in public ownership all the coal."). In so doing, the Committee was specifically informed it would retain coal that was not presently valuable, but which could become valuable in the future. *Id.* at 1281 ("[W]hat may not be coking [valuable] coal to-day may be coking coal to-morrow; because there are improvements going on."); *id.* at 1282 ("these [coals] may have a much greater value in the future").[15]

It is apparent from the legislative history of the 1909 and 1910 Acts that Congress understood it had the option

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[15] The dissent finds it anomalous that we rely on Congressional recognition of advancing technology in coal mining to support our conclusion. We, in turn, find anomalous the dissent's position that when Congress reserved in 1909 and 1910 "all coal and the right to . . . mine, and remove the same" it unambiguously intended to give away to a homesteader on lands valuable for coal a hazardous product required at the time to be vented off and wasted in order to safely mine the coal.

to reserve to the United States only coal having current economic value, and rejected that narrow mineral reservation. Congress knew there was indeterminate potential value in the reserved coal and intended to secure that value for the United States.[16] Rather than indicating a limited reservation of coal to the United States, the legislative history suggests that Congress adopted an interpretation of coal which encompassed both the present and future economic value of coal for energy purposes, including value that could only be realized through advances in technology such as those which drive the present day exploration for CBM.

We cannot discern from the statute as a whole or the historical context in which it was drafted any unambiguous intention either to convey CBM to the surface patentees,[17] or to retain it. Congress' broad general intent and the absence of a clear conveyance of CBM to the surface patentees, coupled with the principle of statutory construction that resolves ambiguity in favor of the sovereign, however, persuades us that CBM was reserved to the United States.

3. Related Statutes

Our conclusion that the reservation of coal should include CBM is buttressed by the interpretation given to analogous statutory mineral reservations. The same principle we rely on here, that ambiguity or uncertainty in the terms employed in land grants should be resolved in favor of the government, has been a subtext in the inter-

[16] Moreover, we cannot believe that Congress would have countenanced ceding CBM to surface patentees, *see infra* note 12, knowing that degasification at the time would have involved damage to and possibly destruction of the very resource sought to be reserved. *See supra* note 10.

[17] "Surface patent" is used throughout this opinion to indicate the surface estate patented to agricultural entrants under the 1909 and 1910 Acts, which estate included all minerals other than coal.

pretation of many similar statutes reserving minerals to the United States.

In 1914, Congress enacted the Agricultural Entry Act, 30 U.S.C. §§ 121-125 (hereinafter the 1914 Act), reserving "phosphate, nitrate, potash, oil, gas, or asphaltic minerals" to the United States, *id.* § 121. Then in 1916, Congress enacted the Stock-Raising Homestead Act, 43 U.S.C. §§ 291-301 (hereinafter the 1916 Act), which reserved to the United States "all the coal and other minerals," *id.* § 299. Uniformly, courts have treated these mineral reservations expansively. *Western Nuclear, Inc.*, 462 U.S. at 60 ("gravel is a mineral reserved to the United States in lands patented under" the 1916 Act); *Aulston*, 915 F.2d at 585 (reservation of "gas" in the 1914 Act includes carbon dioxide); *Union Oil Co.*, 549 F.2d at 1279 (geothermal energy included in 1916 Act's reservation of "all the coal and other minerals"); *Brennan v. Udall*, 379 F.2d 803, 804 (10th Cir. 1967) (oil shale included in 1914 Act reservation of oil). Although the language employed in the 1914 and 1916 reservations is more expansive and admits more variety in type and character of mineral reservation than the language used in the 1909 and 1910 Acts, judicial interpretations of these statutes have reached for the outer limits of reasonable construction in favor of the sovereign. A particularly notable example is one court's classification of geothermal energy (hot water and steam) as a "mineral." *Union Oil Co.*, 549 F.2d at 1279. In fact, we have found no occasion in which a reservation of a mineral asset to the United States has been treated narrowly to exclude a newly appreciated value associated with that mineral; the cases cited above offer no support for doing so now.[18]

[18] In 1955, to aid exploration and extraction of uranium and other source materials in coal reserved to the United States by the 1909 and 1910 Acts, Congress enacted legislation to control "Entry and Location on Coal Lands on Discovery of Source Material." 30 U.S.C. §§ 541-541i (hereinafter the 1955 Act). The Amoco defendants consider the legislative history of the 1955 Act relevant to our

4. Summary

In summary, the direct legislative history of the coal lands acts indicates that Congress intended a reservation of coal that encompassed both the present and future economic value of coal. Congress was aware that full economic realization of that benefit would require advances in technology. Present day exploitation of CBM is a benefit of coal ownership that is consistent with Congress' general statutory intent. Given the absence of value attributed to CBM in 1909 and 1910 and the danger it presented to coal miners, we cannot infer that Congress unambiguously intended to convey to the surface patent holder a component of coal which could not be severed at the time of the statutes' enactments except in the process of mining the coal itself.

III

For the foregoing reasons, we hold that "coal" as used in the Coal Land Acts of 1909 and 1910 neither unambiguously includes or excludes coal bed methane. Given the established principle that all doubts respecting land

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determination of CBM ownership. We are not persuaded Amoco's interpretation of the legislative history of the 1955 Act is the only interpretation the enactment will bear. In any event, Congress' allocation of the right to extract uranium in coal cannot be equated to the CBM at issue in this case because uranium is not invariably included in coal as part of the coalification process and because the 1955 Act does not purport to apply to nonfederal lands.

Amoco also relies on a 1933 House of Representatives' report to suggest that Congress has recognized dual ownership between the United States and agricultural patent holders when reserved minerals are found commingled with unreserved minerals. Amoco En Banc Br. at 47 (citing H.R. REP. No. 72-1938, at 2 (1933)). The House report and the subsequently enacted 1933 Act, which consolidated in the United States ownership of commingled sodium and potash, 30 U.S.C. § 124, do not particularly inform us about the 1909 and 1910 coal reservations, and certainly do not persuade us to ignore our mandate to resolve doubts and ambiguities in the 1909 and 1910 coal reservations in favor of the sovereign.

grants and mineral reservations are construed in favor of the government, *see Watt v. Western Nuclear, Inc.*, 462 U.S. at 59, we conclude that coal reserved to the United States in the 1909 and 1910 Acts includes the adsorbed CBM.

The judgment of the district court is REVERSED and the case is REMANDED for further proceedings.[19]

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[19] Our reversal will require the district court to address the defenses asserted by defendants to preclude recovery by the Tribe, at least some of which appear to raise issues of serious magnitude.

Tacha, J., dissenting

The majority finds that when Congress used the word "coal" in 1909 and 1910, it may have been referring not only to the solid rock we all understand coal to be, but also a gas by-product of coal, some of which seeps into nearby rock and some of which remains in the air pockets or cracks in the coal. Because coal was not understood, either in 1909 or today, to include a gas, I respectfully dissent.

I.

This appeal hinges on a single question of statutory interpretation: does the federal government's reservation of coal in the Coal Lands Acts of 1909 and 1910 include coalbed methane (CBM), a gas that exists in and around coal deposits?

When interpreting statutory terms, "[o]ur task is to give effect to the will of Congress." *Griffin v. Oceanic Contractors, Inc.*, 458 U.S. 564, 570 (1982). Of course, the most persuasive evidence of Congress's will are the words that Congress used in the statute itself. *See United States v. American Trucking Ass'ns.*, 310 U.S. 534, 543 (1940); *Finley v. United States*, 123 F.3d 1342, 1347 (10th Cir. 1997) (en banc). Therefore, perhaps the most basic rule of statutory construction is that when the language of a statute has a reasonably plain meaning, "that language must ordinarily be regarded as conclusive." *Griffin*, 458 U.S. at 570 (citations and internal quotation marks omitted); *Moskal v. United States*, 498 U.S. 103, 108 (1990). Only the most extraordinary showing of a contrary legislative intent can justify a departure from the plain meaning of statutory language. *See Garcia v. United States*, 469 U.S. 70, 75 (1984).

The plain-meaning rule is a basic consequence of our system of separated government powers, in which judges must yield to the political decisions of legislators. "Deference to the supremacy of the Legislature, as well as recognition that Congressmen typically vote on the language

of a bill, generally requires us to assume that 'the legislative purpose is expressed by the ordinary meaning of the words used.' " *United States v. Locke*, 471 U.S. 84, 95 (quoting *Richards v. United States*, 369 U.S. 1, 9 (1962)). The Judiciary has no license "to soften the clear import of Congress' chosen word whenever a court believes those words lead to a harsh result." *Locke*, 471 U.S. at 95.

The relevant legislative intent is that of the Congress that passed the disputed provision. *See Andrus v. Charlestone Stone Products, Co.*, 436 U.S. 604, 611 (1978); *Watt v. Western Nuclear, Inc.*, 462 U.S. 36, 47 (1983) (referring to the meaning of "minerals" in 1916 when interpreting Stock-Raising Homestead Act of 1916). Thus, we must determine the ordinary meaning of "coal" as it was understood in 1909 and 1910, not the present.

The majority opinion concludes that "coal" has no plain meaning because the statutes "neither define coal nor mention CBM." *See* Maj. Op. at 18. It is well-established, however, that a term need not be defined in a statute in order to have a controlling plain meaning. Instead, when a statute does not define a word, we give that word its ordinary or natural meaning. *See Smith v. United States*, 508 U.S. 223, 228 (1993); *Sutton v. United Air Lines, Inc.*, 130 F.3d 893, 898 (10th Cir. 1997). For several reasons, it is plain to me that the ordinary and common meaning of "coal" as Congress understood it in 1909 did not include coalbed methane.

A.

First, the term coal is not ordinarily understood to refer to a gas. "Common and ordinary usage may be obtained by reference to a dictionary." *United States v. Roberts*, 88 F.3d 872, 877 (10th Cir. 1996). As the district court pointed out, the dictionaries and general reference works of the late-nineteenth and early twentieth century uniformly described coal as a solid material. *See Southern*

Ute Indian Tribe v. Amoco Prod. Co., 874 F. Supp. 1142, 1153 (D. Colo. 1995) (citing AMERICAN DICTIONARY OF THE ENGLISH LANGUAGE 244 (1889) (defining coal as a "black, or brownish black *solid*, combustible substance consisting . . . mainly of carbon"); WEBSTER'S NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE 424 (1920) (defining coal as "a black, or brownish black, *solid*, combustible mineral substance"); A. FAY, A GLOSSARY OF THE MINING AND MINERAL INDUSTRY 163 (1920) (describing coal as "a *solid* substance varying in color from dark-brown to black, brittle, combustible, and used a fuel") (emphasis added)); *see also* E.A.N. ARBER, THE NATURAL HISTORY OF COAL 4 (1912) ("[C]oal is *not a mineral but a rock*. Coal is as much a rock as standstones, limestones, granites or marbles.") (emphasis in original). These descriptions of coal as a "solid" are the first indication that the collective understanding of coal in 1909 did not include CBM, a gas.

More importantly, the people of 1909 knew of the existence of CBM. CBM is a combustible gas released in the coal mining process. In the early twentieth century, coal miners ventilated mines before entering them to reduce the chance of explosions, used canaries to detect methane levels, and at times even purposefully lit collected gas to remove it from the mines. Despite these efforts, the ignition of CBM in coal mines led to the death of hundreds of coal miners each year. *See* Rollin T. Chaimberlain, *Notes on Explosive Mine Gases and Dusts*, U.S. Geol. Surv. Bull. 383, H.R. Doc. No. 1583, 60th Cong., 2d Sess., at 6 (1909). Because CBM was such an important—and dangerous—aspect of coal mining, it was very much a part of the general knowledge in 1909. It is clear not only that people of the time were aware that CBM existed, but also that they thought of CBM as a gas: one of the common names used for it was "marsh gas."

If there had been no knowledge of CBM in 1909, the contemporary definitions of coal as a "solid" would have been ambiguous as to CBM, and the majority would be correct that it is unclear whether the 1909 reservation of "coal" was meant to include only the solid coal rock, or whether it also included the CBM gas contained in and around the coal. It is extremely unlikely, however, that a people as familiar with CBM gas as the people of 1909 would define coal as a "solid" if they also thought of CBM gas as coal. It is much more likely—indeed, it is quite plain—that the 1909 descriptions of coal as a solid, despite the intimate familiarity with CBM, is a further indication that the people did not believe that coal included CBM, a gas.

It is axiomatic that gas and solids are two distinct properties, and that one is not thought to include the other. It is illuminating, however, that reference works of the times provided separate, non-overlapping definitions of coal and "marsh gas." *See, e.g.*, THE UNIVERSAL ENCYCLOPAEDIC DICTIONARY 945 (1905) (defining "coal" as "a stratified rock"); *id.* at 2637 (defining "marsh gas" as "a hydrocarbon gas very abundant in nature"). These works demonstrate a commonly understood difference between marsh gas released as a consequence of coal mining and the coal itself. The fact that Congress understood coal to be a solid, understood that marsh gas existed as a gas, and did not mention marsh gas in the statutes, persuades me that they did not mean to include CBM when they said "coal."

B.

1.

Two further points support my plain-meaning interpretation of the term "coal." The first involves the uses to which coal and CBM were put in 1909 and 1910. As the district court noted, coal—that is, the solid material—was the nation's primary energy resource in the early twentieth century. *See Southern Ute Indian Tribe*, 874 F. Supp. at 1149. Coal was the driving force behind this

country's transition from an agrarian economy to an industrial economy. *See id.* Coal, the solid, heated our nation's homes and played an indispensable role in the production of steel. The importance of the mineral to our nation cannot be overstated. Marsh gas, to the contrary, was considered a waste product. As I have said, miners knew of it because it was a danger to their lives, but the gas had no economic value at the time.

In the early 1900s, a "coal famine" struck the West. That shortage in supply led to government investigations and the discovery that many had fraudulently procured land that was rich in coal. This discovery, in turn, prompted President Roosevelt to withdraw vast amounts of land from the homesteading process and ultimately led to the passage of the Coal Lands Acts. In reserving coal to the federal government, Congress was attempting to manage and conserve the country's most important resource—the solid rock coal—not the waste by-product coalbed methane. When examined against the backdrop of the early twentieth century, the majority's interpretation that Congress may have thought "coal" also included CBM, an unused and unusable gas, seems extremely artificial.

One of the plaintiff's own experts said in a report that pre-dates this action:

> Coal has *classically* been regarded as a solid fuel. . . . [I]n terms of its conventional usage, coal is considered to be a (solid) rock which could be burned and utilized as an energy resource. Based upon this definition, utilization of the energy potential of a coal bed would necessarily entail the mining of the coal and removal to the surface, during which process most of the entrapped methane would be released. The residual "solid" is what would be conventionally regarded as "coal", to the exclusion of any escaped gases that were originally present underground.

Applt. App. at 1602, 1604 (Report of Jeffrey R. Levine, Ph.D.) (emphasis added) (parentheses in original).[1] This *classical* understanding of coal dated back at least to 1909.

Without explanation, the majority contends that the fact that CBM was useless in 1909 makes the statute ambiguous as to CBM. *See* Maj. Op. at 27 ("[W]here the commercial value of CBM was unappreciated at the time of the enactment, the text of these acts gives us no particular indication of Congress' *specific intent* with regard to that asset."). I draw quite the opposite conclusion. CBM was a waste product in 1909. Its ownership not being desirable, one would not expect the United States to reserve it. Because a reservation of CBM would go against expectations, that would make it *more*, rather than less, imperative for the government to mention the gas in its reservation of coal. Thus, the fact that CBM had no value confirms the plain meaning, rather than creating an ambiguity.

The text of the majority opinion just quoted from not only fails to convince me that CBM's lack of value creates an ambiguity, it also points back to the majority's central interpretive error. The passage suggests that because the statute does not refer to CBM, it is ambiguous with regard to CBM. Earlier in its opinion, the majority states explicitly that the 1909 and 1910 Acts do not "mention CBM; thus, the statutes do not by their plain language indicate congressional intent regarding CBM." Maj. Op. at 18. Likewise, the 1909 and 1910 Acts do not mention the Holy Grail, the Hope Diamond, or my left shoe. Yet I doubt that if any of these items were found within a coalbed reserved by the United States in

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[1] This document was originally produced in the district court and was subject to a Protective Order governing confidential documents in this case. Without objection, the appellants included this report in the public record on appeal. Therefore, we cite to it. All other documents produced in this case remain subject to the confidentiality provisions of the Protective Order.

1909 and 1910, one would conclude that they might actually be "coal." Silence does not equate with ambiguity.

2.

Secondly, coal retains all of its economic value after the natural release of the methane.[2] This too was commonly understood in 1909. That CBM has no effect on the uses of coal highlights the independence of the two minerals. Contrast CBM's presence within coal and that of water's presence within coal. Some water is always present inside coal. It forms hydrogen bonds with the coal. These bonds are much stronger than those that bind CBM to the surface of the coal. The presence of water in coal affects the economic value of coal; the drier coal is, the better it burns—the less water in coal the better. That water affects coal's ability to create energy—its distinguishing characteristic in our society—creates a question as to whether it is actually part of the coal or not. No such ambiguities, however, exist for CBM. Regardless of how much CBM is trapped in or on coal, the coal's value is unchanged. I reemphasize that this was commonly understood in 1909.

C.

I cannot fail to mention that the court's reading of the word "coal" as ambiguous controverts its plain meaning in at least one additional respect. Much of the CBM in a coal deposit—over 90 percent according to the record—strays from the coalbed over time. It escapes into nearby rock such as sandstone or shale. This too was

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[2] The following exchange occurred in the deposition of the plaintiff's expert:

> "Q. Is there any use that you can think of to which coal—which is made of coal which cannot be made after methane is removed from it?
>
> A. I can't think of any at this time."

Applt. App. at 1685.

commonly understood in 1909. The majority states that its opinion applies only to the CBM that remains within the coalbed. *See* Maj. Op. at 24 n.8. The majority's reluctance to address CBM that has escaped from the coalbed is understandable, because doing so reveals the conflict between the classical understanding of "coal" and the result reached in this case. If the majority were to declare that the 1909 Congress did not think of escaped CBM as coal—an entirely correct declaration—it would find itself in the uncomfortable position of saying that Congress might have thought that some CBM is coal (i.e., the CBM trapped in coal deposits), but that some CBM definitely is not coal (i.e., the escaped CBM), even though there is no chemical difference between the two groups of CBM. The only difference between the two is dumb luck. In the formation of the coalbed and surrounding rock, some methane was captured by the coal and some was not.

If the majority were being true to its own reasoning, it would find that Congress's use of "coal" in 1909 is also ambiguous with respect to the CBM that escapes into nearby rock. That conclusion, however, exposes bare the chasm between the traditional understanding of "coal" and today's result. No one attuned to the common understanding of coal, either today or in 1909, would say that sandstone that has been penetrated by methane that originated in a coalbed contains "coal."

II.

A.

The majority rejects the plain meaning analysis for two reasons, neither of which is persuasive. First, the court asserts that the 1909 Congress may have thought CBM was part of the solid rock. *See* Maj. Op. at 23 ("[T]here was enough undisputed information about the unique nature of CBM to indicate that even if Congress intended to retain only solid rock coal, Congress in 1909

may have considered CBM to be part of that solid coal."); *id.* at 24 ("Although CBM in a gaseous state can be produced from coal, prior to that production most CBM is not sufficiently like other natural gases for us to conclude that Congress in 1909 unambiguously intended the owners of other natural gases to also own CBM associated with the reserved coal."); *id.* at 25 ("CBM is so intimately associated with coal that Congress in 1909 could have considered it part of the solid rock."). The majority does not identify the "undisputed information" or the "unique" properties of CBM upon which it relies for its conclusion. Apparently, the distinction between CBM and other natural gases that the majority finds important is the fact that other gases expand indefinitely, while CBM (that is, the portion of the CBM that remains with the coal deposit) is either trapped inside air pockets in the coal or attached to smaller fractures or pores on the surface of the coal. I fail to discern the legal difference that these features of CBM make.

The fact that some of the gas is trapped in the coal, and therefore does not expand indefinitely, cannot be the decisive factor. Gas becomes trapped in sandstone, shale, and other rocks, and yet we still consider it gas. In fact, this is exactly what happens to the CBM that escapes from the coalbed. It becomes trapped in adjacent rock. *See* Jeff L. Lewin, et al., *Unlocking the Fire: A Proposal for Judicial or Legislative Determination of the Ownership of Coalbed Methane*, 94 W. VA. L. REV. 563, 573 (1992). There is nothing unique about gas being trapped in a rock. Likewise, when gas is released from the ground, it must be trapped in containers in order to be made useful. Nonetheless, we do not say that a tank of natural gas is not gas, merely because it is not expanding indefinitely. In order to be a gas, an element must possess "*the ability to* expand indefinitely." *See* Maj. Op. at 24 n.9 (quoting RANDOM HOUSE WEBSTER'S COLLEGE DICTIONARY 550 (1995) (emphasis added). No one would dispute that CBM possesses that characteristic. *See, e.g.*,

Applt. App. at 1609 (Report of Jeffrey R. Levine, Ph.D.) ("In a gaseous state methane behaves very nearly as an 'ideal' gas, meaning that it exhibits very little attractive forces between molecules, and its behavior conforms fairly closely with the 'Ideal Gas Law.' ").

Similarly, the fact that some gas attaches to the smaller "micropores" on the surface of the coal cannot be a basis to believe that the 1909 Congress may have thought the gas was part of the solid rock. As the majority points out, a process known as "adsorption" or "sorption" causes some CBM to collect in pores on the surface of the coal. There are two types of sorption: physical sorption and chemical sorption. The sorption process relevant to this case is physical sorption. Physical sorption occurs between gases of all types and solids. The gas is held close to the coal's surface area by weak forces known as van der Waals forces. According to the plaintiff's expert, van der Waal's forces occur "between most any pair of substances." Applt. App. at 1687. The forces are so weak that neither the gas molecules nor those on the surface of the solid are chemically altered. The deposition of one of the plaintiff's experts reveals the pervasiveness (and weakness) of van der Waals forces:

> Q. If I put this paper on the table, is the bottom page bound to the table by van der Waals forces?
>
> A. To a certain degree, yes.
>
> Q. Is it part of the table?
>
> A. No, it is not.

Applt. App. 1694. The van der Waals forces that hold the gas to the surface have been likened to gravity—it keeps us on the ground but does not make us part of mother earth.

In contrast, when chemical sorption occurs, actual chemical bonds form between the gas and the solid. This

leads to an irreversible change in the chemical properties of both the gas and the solid. Physical sorption, unlike chemical sorption, can be reversed; the sorbed gas can be removed from the solid by the simple reduction of pressure.

Although the majority uses suggestive rhetoric in stating that CBM has a "unique nature," *id.* at 23, that it is "molecularly attracted to coal," *id.* at 24, "intimately associated with coal," *id.* at 25, and an "integral component of coal," *id.* at 26, it does not actually identify a reason to believe that the physical sorption of CBM makes it part of the coal, or that the 1909 Congress believed that it was part of the coal. The physical sorption of CBM in coal—to the ordinary understanding—is much like the retention of water in a sponge. And yet we do not believe, merely because of the "intimate association" between the water and the sponge, that they have become one and the same. Instead, we conceive of the liquid water and the solid sponge as two distinct items. There is nothing about the process of physical sorption—which occurs as a result of universal van der Waals forces and is reversible upon the mere reduction of air pressure—that leads me to conclude that the ordinary and traditional understanding of coal should be abandoned. In fact, it confirms that "coal" does not include CBM.

The crux of the majority's argument is that the understanding of CBM and coal in 1909 was inconclusive enough that Congress may have intended to reserve CBM when it reserved coal. In footnote twelve, the majority presents a different and far bolder argument—which is nonetheless wrong also. Rather than arguing that the scientific information available in 1909 created an *ambiguity* with regard to CBM, the majority in footnote twelve states that scientists in 1909 *actually understood CBM to be part of coal*. The majority offers one quotation in support of that statement: "The ultimate source

of the gases [within coal] . . . has arisen from the slow decomposition of organic matter as a by-product in the process which has converted vegetable humus into coal." Rollin T. Chaimberlain, *Notes on Explosive Mine Gases and Dusts*, U.S. Geol. Surv. Bull. 383, H.R. Doc. No. 1583, 60th Cong., 2d Sess., at 16 (1909). The majority's belief that this statement supports its position highlights the error of its ways. This source clearly identifies CBM as a *by-product* of coal. A by-product is something separate, secondary, or additional to the principal product from which it came. *See* WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 307 (1981). A "by-product" of coal is far different from an "integral component" of coal, as the majority describes CBM at another part of the opinion. Maj. Op. at 26. This quotation creates no ambiguity as to the ordinary meaning of "coal," nor does it indicate that scientists actually believed CBM was part of coal, though it does create an ambiguity in the majority's rationale. In fact, this quotation supports my position that the scientists of 1909 understood coal and CBM to be separate and distinct.

Other sources directly conflict with the majority's assertion that CBM was considered part of coal in 1909. For instance, only fifteen years after the passage of the first Coal Lands Act, scientists were saying:

> What we know about the chemistry of coal is almost negligible. It is true that chemists have considerable knowledge of the products of distillation, but probably *none of those substances are to be found in coal as such.*

REINHARDT THIESSEN, THE ORIGIN AND CONSTITUTION OF COAL 3 (1924).

B.

The other fact that the majority relies on in rejecting the plain meaning of "coal" is that in 1909-10, there was

no process by which CBM could be extracted from coal and captured without damaging or destroying the coal. Apparently, CBM could not be captured without actually removing the coal from the earth and crushing it in an airtight receptacle. Assuming this to be true, it should make no difference in our interpretation of the statute.

1.

The majority's reliance on the lack of extraction technology demonstrates that it has conflated two very different questions. The majority concludes that because CBM could not be mined without destroying the coal, the coal owner must also have owned the CBM. Even in 1909, however, the common law on split mineral estates distinguished between the questions of (1) who owns a mineral under the ground, and (2) the extent to which the owner can interfere with the property rights of another to extract his mineral.

For instance, in *Chartiers Block Coal Co. v. Mellon*, 25 A. 597 (Penn. 1893), the surface owner had granted the right to the coal under his land to the plaintiff, Chartiers Block. Subsequently, the surface owner realized that valuable oil and gas lay beneath the coal. Thus, the surface owner made leases for that oil and gas, and the lessees began to drill for it, intending to drill wells through the coal stratum. Chartiers Block sought an injunction on two grounds: (1) the lessees had no right to the minerals under the coal, and (2) even if they did, they could not drill through the coal to access the oil and gas because the lessees' mining operations would destroy the value of the coal. *See id.* at 597. The structure of this challenge reveals that the plaintiff recognized the distinction between ownership of a mineral and the right to extract it. The Pennsylvania Supreme Court's decision confirms that the law recognized the distinction even in 1893.

The court first easily rejected the notion that the owner of the coal estate had any rights to the underlying oil and

gas merely because the lessees had to penetrate the coal to get to it. *See id.* at 599 ("The grantee of the coal owns the coal, *but nothing else* . . . .") (emphasis added); *id.* ("The position that the owner of the coal . . . may forever prevent the surface owner from reaching underlying stratum, has no authority in reason, nor, do I think, in law."). Whether or not the oil and gas mining would destroy the value of the coal was immaterial to the prior question of who owned the oil and gas. The court ruled that the lessees could drill through the coal to get to their gas and oil, provided that they did not inflict unreasonable damage to the coal. *See id.* (finding that the lessees have a right of access but that "the right may be suspended during the operation of the removal of the coal to the extent of preventing any wanton interference with the coal mining.").

In reaching its conclusion, the court clearly distinguished between mineral ownership rights and the right to extract that mineral.

> [W]hen the owner of the surface parted with the underlying coal, he parted with nothing but the coal. He gave no title to any of the strata underlying it, and it is not to be supposed for a moment that the grantor parted with or intended to part with his right of access to it. . . . *The only question is how that right shall be exercised, by what authority, and under what limitations.*

Id. Accordingly, the court said that "[t]he right of the surface owner to reach his estate below the coal exists at all times. *The exercise of it may be more difficult at some times than at others.*" *Id.* (emphasis added). Thus, *Chartiers Block* stands for at least two propositions. The first is that the surface owner who has granted coal right to another retains title in *everything* but the coal. The second is that the surface owner can extract the minerals that he owns as long as he does not unreasonably damage the coal. These principles remain part of the common

law today. *See, e.g., Notch Mountain Corp. v. Elliot*, 898 P.2d 550, 556 (Colo. 1995) (en banc) (stating that owner of mineral estate may make reasonably necessary use of the surface owner's land to extract minerals).

If the majority is correct in asserting that CBM could not be extracted in 1909 without destroying coal, that does not lead to the conclusion that the surface owner did not own the CBM. At most, it means that the surface owner could not immediately mine for CBM because mining would have led to unreasonable damage to the coal. *See Chartiers Block*, 152 P.2d at 297 ("The most that can be claimed is that, pending the removal [of the coal, the plaintiff's] right of access to the lower strata is suspended."). The majority is incorrect in finding that the inability to extract CBM from coal without damaging the coal determines the separate ownership question.[3]

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[3] The majority responds to our discussion of the distinction between ownership rights and extraction rights, and *Chartiers Block* in particular, by noting that ninety years after that decision, the Pennsylvania Supreme Court decided in *United States v. Hoge*, 468 A.2d 1380 (Pa. 1983) that a private deed granting coal included a grant of CBM. *Hoge* is inapposite for two reasons. First, it does not in any way call into doubt *Chartiers Block*'s distinction between ownership and extraction rights, the point for which I cited it. Second, *Hoge* interprets a deed rather than a federal reservation of a mineral. Interestingly, the original panel opinion in this case explains why a state case about a common law deed, like *Hoge*, is irrelevant to this appeal:

> The [parties] have cited state court cases which have considered ownership of CBM. As interesting as these cases are (four of five deciding ownership of CBM is in the coal owner), they are not dispositive of the case at bar. The state cases construe CBM ownership in the context of common law deeds, which are negotiated conveyances with specific rules and presumptions of construction. These cases ultimately have little to offer in terms of our interpretation of Congressional intent in the 1909 and 1910 Acts.

See Southern Ute Indian Tribe v. Amoco, 119 F.3d 816, 828 n.17 (10th Cir. 1997). Notwithstanding the majority's marked reversal on the importance of the state cases, the *Hoge* opinion itself demonstrates why it has "little to offer" in this appeal. For instance, *Hoge* relies on the common law rule that "as a general rule, subterranean gas is owned by whoever has title to the property in which the gas is resting." *Hoge*, 468 A.2d at 147. Also, in discerning the intent of the *parties to the instrument*, the *Hoge* court worked on the premise that the parties intended to reserve only those minerals which were "generally known to be commercially exploitable." *Id.* at 150. Although I ultimately disagree with the majority's result, I do agree with them that the government's intent in this case was not merely to reserve coal that was commercially exploitable in 1909-10. Thus, *Hoge* and the other state cases present different inquiries and different rules of construction than those at work in this case. Thus, as the panel said the first time around, they have extremely limited value here.

The majority's reliance on the lack of CBM-extraction technology to conclude that Congress may have thought of CBM as an integral part of coal also reveals an unresolvable internal conflict in the majority's reasoning, specifically between parts II.B. and II.C.2 of its opinion. In Part II.B, the majority concludes that the 1909 Congress's specific intent with regard to CBM is ambiguous. In so concluding, the majority relies on the fact that in 1909, it was technologically impossible to separate CBM from coal without destroying the coal. *See* Maj. Op. at 26 ("It is not reasonable to impute to Congress a desire to retain only solid rock coal . . . when CBM is an integral component of coal and in 1909 there appears to have been no technology by which a patent holder could extract and capture CBM from coal without damaging or destroying the coal."). The majority argues, in short, that the lack of technology shaped the way Congress thought about coal and CBM in 1909.

In Part II.C.2, however, the majority reverses its position completely. Seeking to explain Congress's "general intent," the majority finds that Congress intended to capture the entire future value of the coal that it reserved. Therefore, the court, in putting forth its case that CBM is part of the economic value of coal, relies on an assertion that Congress knew there would be technological ad-

vances in the coal mining field, and that Congress intended to take advantage of those technological advances. *See* Maj. Op. 38 ("Congress adopted an interpretation of coal which encompassed both the present and future economic value of coal for energy purposes, including value that could only be realized through advances in technology such as those which drive the present day exploration for CBM."). The majority never explains how it can state that the lack of technology in 1909 shaped Congress's view of CBM, and yet later rely on the fact that Congress anticipated technological advances to explain how Congress thought about CBM. If Congress anticipated technological advances such as those that make CBM mining possible today, the lack of mining technology in 1909 should not have had any effect on its ability to conceive of CBM and coal as two separate entities.

I agree that the 1909 Act envisioned technological advances affecting the coal mining industry. Thus, as the majority points out, Congress reserved to itself coal that was not economically useable in 1909 and 1910. Nonetheless, that does not change the fact that there is a limit on the natural and plain meaning of the term coal. The meaning of coal does not include CBM, regardless of technologies that make it available or unavailable.

III.

In 1909, people thought of gases and solids as separate entities. Their understanding was no different with regard to the relationship between coalbed methane—a dangerous gas emitted from coal mines—and coal itself. Coal, as used in the Coal Lands Acts of 1909 and 1910, has a plain meaning that does not include CBM. The majority attempts to create an ambiguity through analysis of the scientific process that keeps some of the CBM layered on the solid coal. For the reasons stated above, that analysis confirms the plain understanding rather than contradicting it. Because I find no ambiguity in the statute, I see no reason to invoke the rule that calls for interpreting ambiguities in a federal reservation in favor of the government.

I respectfully dissent.

Anderson, J. and Baldock, J., join in this dissent.

APPENDIX B

UNITED STATES COURT OF APPEALS
TENTH CIRCUIT

No. 94-1579

SOUTHERN UTE INDIAN TRIBE,
Plaintiff-Appellant,

v.

AMOCO PRODUCTION COMPANY; SHIRLEY K. ADAMS; HENRY ASHWORTH; CARLA M. ASPAAS; ERIC K. ASPAAS; HELEN RUTH ASPAAS; LAURA BELLE ASPAAS; LETA M. ADKINS; RITA M. ADKINS; MAXWELL C. ANDERSON; EARL A. BARKER; MAURICE C. BREEN, named as: Heirs of Maurice C. Breen, deceased; HORACE F. BUCHANAN, named as: the Heirs of Horace Buchanan, deceased; GEORGE A. BUGG; CARBONE INVESTMENT COMPANY; JACK CARMACK; ROWLAND CARMACK; JOSEPH C. CIANCIO; WILLIAM KEMP CLARK; COLORADO NATIONAL BANK, George Veto Trust; COLORADO NATIONAL BANK OF LONGMONT, conservator Gladys N. Frazzini; DOROTHY A. CORGIN; KELLY COX, named as: the Heirs of Kelly Cox, deceased; A.B. CROSBY; BARBARA CROSBY; DAVID CROSBY; JOHN CROW, JR.; MARGARET CROW; MANUEL CRUZ; LOUIS M. CUMMINS; FREDERICK E. DICKERSON; J.M. EAKES; ROBERT MCFERRAN EAKES; MARGARET ELLISON; SALLY M. ETTERBECK; MINNIE FLAKS; TILLIE FLAKS; CASSIO FRAZZINI; ADELE FROST; ROBERT GALBASIN; ABEL S. GALLEGOS; MONTEY GARNAND; RUBY GIBBS GOGGANS; CHRISTINE HAMILTON; HARDIN SIMMONS UNIVERSITY; H.A. HARMON, named as: the Heirs of H.A. Harmon, deceased; HONDO OIL & GAS COMPANY, named as: the shareholders of Hondo Oil & Gas Company (dissolved); HYDE OIL AND GAS CORPORATION;

CHARLES KETTERING; FIDEL LUCERO; RICHARD C. MALCOMB; SUZANNE HEATH MANGES; CATHERINE B. MCELVAIN; MABEL MCELVAIN; THORNTON H. MCELVAIN, JR.; DOROTHY N. MCKELVEY; EDWIN L. MCKELVEY; R. FRANKLIN MCKELVEY; W.R. MCMAHON; MCMURRY OIL COMPANY; W. CLAY MEREDITH CHARITABLE TRUST; W.A. MONCRIEF, named as: the Heirs of W.A. Moncrief, deceased; ROY E. MONTGOMERY, personal representative for the Estate of W. Clay Meredith, deceased; FORREST D. MILLER, named as: the Heirs of Forrest D. Miller, deceased; HELEN L. MILLER, named as: the Heirs of Helen L. Miller, deceased; THOMAS S. MORRISSEY; THOMAS J. MORRISSEY; EMIL MOSBACHER; EMIL MOSBACHER, III; JOHN DAVID MOSBACHER; R. BRUCE MOSBACHER; MYRA THERESA MOULDS; NORTH CENTRAL OIL CORPORATION; H.L. OLIVER; CLARA ONOFRIO; MARGARET C. PARGIN; HAROLD F. PAYNE, JR.; NEVILLE G. PENROSE; BEN M. PETERSON, JR.; FREDERICK PETROCCO; PHILLIPS PETROLEUM COMPANY; JAMES M. RAYMOND; W.E. RENNIE, named as: the Heirs of W.E. Rennie, deceased; THOMAS C. ROMOLO; BENTON E. SMULLYEN; CLINTON I. SMULLYEN; WILLIAM STIRLING; J.L. TATUM, named as: the Heirs of J.L. Tatum, deceased; ANNA CARLEO TOMEO; ERNEST TOMEO; TURNER SECURITIES; RICHARD W. TURNER, SR.; GEORGE C. VANCE, named as: the Heirs of George C. Vance, deceased; ANTHONY H. VETO; JOSEPH F. WARE, JR.; ALBERT E. ZARLENGO; ANTHONY F. ZARLENGO, John Doe and all other unknown persons claiming an interest in the mineral estate located within the N/2 of section 12, T33N, R8W, N.M.P.M., La Plata County, Colorado; AMAX OIL & GAS, INC.; BOWEN/EDWARDS ASSOCIATES, INC.; FUEL RESOURCES DEVELOPMENT COMPANY; MCKENZIE METHANE CORPORATION; MERIDIAN OIL, INC.; MOBIL OIL CORPORATION; NATIONAL COOPERATIVE REFINERY ASSOCIATION; NORTHWEST PIPELINE CORPORATION; PABLO OPERATING COMPANY; PALO/EAGLE JOINT

VENTURES; RICHMOND PETROLEUM, INC.; WILLIAMS PRODUCTION COMPANY; UNION TEXAS PETROLEUM CORPORATION, John Doe oil company and all other unknown persons or entities claiming leasehold working interests or operating rights to explore for, produce or develop coalbed methane or coal constituents from coal or coal strata reserved by the United States in patents issued under The Act of June 22, 1910, for lands located within the exterior boundaries of the Southern Ute Indian Reservation, and which entities have not obtained tribal consent to and federal approval of said exploration, production or development activities; MANUEL LUJAN, JR., Secretary of the United States Department of the Interior; DEPARTMENT OF INTERIOR, and its subordinate agencies; BUREAU OF INDIAN AFFAIRS; BUREAU OF LAND MANAGEMENT; MINERALS MANAGEMENT SERVICE; EDDIE F. BROWN, Assistant Secretary of the Bureau of Indian Affairs; CATHERINE FRANCES MCELVAIN HARVEY; DELOS CY JAMISON, Director of the Bureau of Land Management; and SCOTT S. SEWELL, Director of the Minerals Management Service; Class of Defendants situated similarly to those named non-governmental defendants who claim ownership of an interest in coalbed methane and other coal constitutents or claim the right to explore for, develop or produce those substances from coal or coal strata reserved by the United States in patents issued under the Act of March 3, 1909, or the Act of June 22, 1910, for lands located within the exterior boundaries of the Southern Ute Indian Reservation and which class members have not obtained tribal consent to and federal approval of said interests of rights; JACK BALLE; J.M. HUBER CORPORATION, Oil & Gas Division; MARY JEAN BALLE; DONALD C. CIANCIO; SUSIE M. CIANCIO; NCNB TEXAS NATIONAL BANK, as Trustee of the Kelly Cox Testamentary Trust; ADDIE G. CROSBY; JACK W. CROSLAND, JR.; HENRY L. ENOCHSON; MARY JANE ENOCHSON; J.L. GOGGANS; LIBERTY TULSA, as trustee of the

Christine J. Hamilton Trust; HELEN CROSLAND HENDRICKS; THOMAS L. JOHNSTONE; JAMES ERIC KAINDL; LARRY JAMES KAINDL; LISA JEAN KAINDL; JANE P. MOSBACHER, named as The Heirs of Jane P. Mosbacher, Deceased; PM ASSOCIATES, a Colorado general partnership; FIRST INTERSTATE BANK OF DENVER, as Co-trustee of the Estate of W.E. Rennie est W.E. Rennie; RODERICK L. TURNER; WELLS FARGO BANK, as trustee of the George C. Vance Trust; ALBERT E. ZARLENGO, JR., as trustee for the Albert E. Zarlengo Trust; BELL SOUTH CORPORATION HEALTH CARE TRUST; J. MAGNESS, INC.; SG INTERESTS I, LTD; MOSBACHER U.S.A., INC.; LAND OWNERS COALSEAM COMMITTEE,

Defendants-Appellees,

TIFFANY GAS COMPANY,

Defendant.

Appeal from the United States District Court
for the District Court of Colorado
D.C. No. 91-B-2273

Before SEYMOUR, Chief Judge, COFFIN * and MCKAY, Senior Circuit Judges.

SEYMOUR, Chief Judge.

The Southern Ute Indian Tribe (the Tribe) appeals the district court's grant of summary judgment to defend-

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* The Honorable Frank M. Coffin, United States Senior Circuit Judge for the First Circuit, sitting by designation.

ants Amoco Production Company and others on the Tribe's claim to ownership of coal bed methane (CBM) contained in coal acquired by the Tribe as successor in interest to a statutory reservation of coal to the United States. The Tribe also appeals the district court's grant of summary judgment to the Secretary of the Interior, the Department of the Interior, and the Department of the Interior's subordinate agencies (the federal defendants) on the Tribe's claim of breach of fiduciary duty. We reverse the district court on the issue of CBM ownership and remand for further proceedings consistent with this decision.[1]

I.

In 1991, the Tribe brought suit against Amoco Production Company, other oil companies, and individual oil and gas lessees and lessors (the Amoco defendants) who asserted ownership interests in CBM contained in coal owned by the Tribe. In its First Amended Complaint, the Tribe claimed ownership of CBM and asserted that various Amoco defendants, by exploring for and extracting CBM under oil and gas leases, had among other things: 1) trespassed on Tribal lands; 2) trespassed on Tribal coal; 3) converted Tribal coal; 4) failed to pay severance tax to the Tribe; and 5) in collusion with State of Colorado officials, deprived the Tribe of federally guaranteed rights in violation of 42 U.S.C. § 1983. The Tribe sought a variety of remedies including: 1) a declaratory judgment vesting in the Tribe ownership of CBM and other substances contained in Tribal coal; 2) a declaratory judgment that Tribal consent is required for CBM extraction; 3) an order quieting title to CBM in the Tribe; 4) injunctive relief to prevent continued exploration and production of CBM without Tribal consent; 5) damages for present and future injuries to coal, for extraction of

[1] Our reversal will require the district court to address the defenses asserted by defendants to preclude recovery by the Tribe, at least some of which appear to raise issues of serious magnitude.

CBM, for conversion of coal, for civil rights violations, and for failure to pay severance taxes; 6) title to all exploration and production facilities on Tribal lands which, if removed, would interrupt production of CBM; and 7) costs and attorney's fees.

The Tribe also sued the federal defendants in their capacities as trustees for the Tribe. The Tribe claimed that the federal defendants breached their fiduciary duties to the Tribe by allowing exploration and extraction of CBM under oil and gas leases. The Tribe sought a declaratory judgment on the breach of fiduciary duty issue, and sought injunctive relief to prevent the federal defendants from issuing permits to explore for and extract CBM under oil and gas leases or from otherwise acquiescing in the derogation of the Tribe's alleged ownership interest in CBM.

Two issues were identified as fundamental to the resolution of all claims against the Amoco defendants: 1) the determination of CBM ownership, and 2) the existence of and applicability of defenses based on acts or omissions of the Tribe. Since resolution of either issue in favor of the Amoco defendants would settle all claims, the district court granted a joint motion by the Tribe and Amoco to bifurcate these issues. The parties then moved to certify "a defendant class comprised of all persons, except the Tribe and governmental entities, who claim an ownership interest in the coalbed methane" for the purposes of resolving the bifurcated issues. Aplt.'s App., vol. I at 214. Amoco was designated as representative of the class and, in that capacity, brought a motion for summary judgment on the bifurcated issues. *Id.*, vol. II at 353.

The federal defendants supported the Amoco defendants' claim of ownership of CBM and asserted accordingly that they had no fiduciary duty to manage an asset for the Tribe which it did not own. The federal defendants filed a motion for summary judgment based on the Tribe's nonownership of the CBM. In the alternative,

they moved to dismiss the Tribe's action as time-barred. *Id.* at 365. The Tribe brought a cross-motion for summary judgment on the issue of CBM ownership.

The district court held that CBM ownership was vested unambiguously in the Amoco defendants. *Southern Ute Indian Tribe v. Amoco Prod. Co.*, 874 F.Supp. 1142, 1160 (D.Colo.1995). Consequently, the court concluded it "need not address further the application of the common defenses to the ownership question," *id.* at 1160, or reach the federal defendants' claims that the Tribe's action was barred by the statute of limitations, *id.* at 1161. It then granted summary judgment to the Amoco defendants on the issue of CBM ownership, and to the federal defendants on the "issue of breach of fiduciary duty for failure to manage the CBM gas," leaving for later determination other issues concerning fiduciary duty. *Id.* The court denied the Tribe's motion for summary judgment. *Id.* It is from these rulings that the Tribe appeals.[2]

II.

The single issue which is determinative of this appeal is whether the Tribe, as successor in interest to a statutory reservation of coal to the United States made in the coal lands acts of 1909 and 1910, is also the owner of CBM, a gaseous substance contained in coal. "We review a grant of summary judgment de novo, applying the same legal standard used by the district court under Fed.R. Civ.P. 56(c)." *Utah v. Babbitt*, 53 F.3d 1145, 1148 (10th Cir.1995). Summary judgment is appropriate if there are no genuine issues of material fact, and the moving party is due judgment as a matter of law. *Id.* We construe the facts and record in the light most favorable to the party opposing the motion. *Id.* "We also review de novo the district court's interpretation of a federal

[2] The district court certified its judgment for immediate appeal under Fed.R.Civ.P. 54(b).

statute." *Id.*; *see also Pittsburg & Midway Coal Mining Co. v. Yazzie*, 909 F.2d 1387, 1393 (10th Cir.1990).

Determination of CBM ownership where the Tribe has acquired its coal via a statutory reservation to the United States presents a question of statutory interpretation. The purpose of statutory construction is to determine congressional intent. *Griffin v. Oceanic Contractors, Inc.*, 458 U.S. 564, 570, 102 S.Ct. 3245, 3250, 73 L.Ed.2d 973 (1982) ("Our task is to give effect to the will of Congress. . . ."). We must decide whether Congress intended to reserve CBM to the United States (and thus to the Tribe as its successor in interest) as part of the coal reservations in the 1909 and 1910 Acts, or whether Congress intended that CBM be treated as part of the unreserved estate (belonging to the Amoco defendants' predecessors in interest).[3]

Of critical importance is the long recognized principle of statutory construction, applicable here, that "ambiguity or uncertainty in the terms employed [in land grants] should be resolved in favor of the government." *Burke v. Southern Pac. R.R. Co.*, 234 U.S. 669, 680, 34 S.Ct. 907, 912, 58 L.Ed. 1527 (1914). It is an " 'established rule that land grants are construed favorably to the Government, that *nothing passes except what is conveyed in clear language*, and that if there are doubts they are resolved for the Government, not against it.' " *Watt v. Western Nuclear, Inc.*, 462 U.S. 36, 59, 103 S.Ct. 2218, 2231, 76 L.Ed.2d 400 (1983) (quoting *United States v. Union Pac. R.R. Co.*, 353 U.S. 112, 116, 77 S.Ct. 685, 687, 1 L.Ed.2d 693 (1957)) (emphasis added) (concluding that gravel is included in mineral reservation to the United States). The burden remains on defendants here to dispel any ambiguity in the construction of the coal reservation.

[3] We consider *infra* part II D, and reject, defendants' alternative argument that if Congress' intent is not clearly expressed we must defer to the Department of the Interior's statutory construction.

A. Plain Meaning of the Statutes

"In ascertaining the plain meaning of [a] statute, the court must look to the particular statutory language at issue, as well as the language and design of the statute as a whole." *K Mart Corp. v. Cartier, Inc.*, 486 U.S. 281, 291, 108 S.Ct. 1811, 1818, 100 L.Ed.2d 313 (1988). "In interpreting statutes, we begin with the relevant language." *Aulston v. United States*, 915 F.2d 584, 589 (10th Cir.1990). Where the will of Congress "has been expressed in reasonably plain terms, 'that language must ordinarily be regarded as conclusive.' " *Griffin*, 458 U.S. at 570, 102 S.Ct. at 3250 (quoting *Consumer Prod. Safety Comm'n v. GTE Sylvania, Inc.*, 447 U.S. 102, 108, 100 S.Ct. 2051, 2056, 64 L.Ed.2d 766 (1980)).

The relevant part of the 1909 Act states that "[a]ny person . . . shall . . . upon making satisfactory proof of compliance with the laws under which such lands are claimed, receive a patent therefor, *which shall contain a reservation to the United States of all coal in said lands, and the right to prospect for, mine, and remove the same.*" 30 U.S.C. § 81 (emphasis added) (hereinafter the 1909 Act).[4] The 1910 Act similarly states that a pros-

[4] In full, the Act states:

> Any person who has in good faith located, selected, or entered under the nonmineral land laws of the United States any lands which subsequently are classified, claimed, or reported as being valuable for coal, may, if he shall so elect, and upon making satisfactory proof of compliance with the laws under which such lands are claimed, receive a patent therefor, *which shall contain a reservation to the United States of all coal in said lands, and the right to prospect for, mine, and remove the same.* The coal deposits in such lands shall be subject to disposal by the United States in accordance with the provisions of the coal-land laws in force at the time of such disposal, but no person shall enter upon said lands to prospect for, or mine and remove coal therefrom, without the previous consent of the owner under such patent, except upon such conditions as to security for and payment of all damages to such owner caused thereby as may be determined by a court of competent jurisdiction. The owner under such patent shall have the right to mine coal for use on the land for domestic purposes prior to the disposal by the United States of the coal deposit. Nothing herein contained shall be held to affect or abridge the right of any locator, selector, or entryman to a hearing for the purpose of determining the character of the land located, selected, or entered by him. Such locator, selector, or entryman who has made or shall make final proof showing good faith and satisfactory compliance with the law under which his land is claimed shall be entitled to a patent without reservation unless at the time of such final proof and entry it shall be shown that the land is chiefly valuable for coal.
>
> 30 U.S.C. § 81 (emphasis added).

pective homestead entrant's "patent shall contain a reservation to the United States of all the coal in the lands so patented, together with the right to prospect for, mine, and remove the same." 30 U.S.C. § 85 (hereinafter the 1910 Act).

The Acts neither define coal nor mention CBM; thus, the statutes do not by their plain language indicate congressional intent regarding CBM. Even in the absence of a plain articulation, however, we have other means available to evaluate congressional intent. *See generally INS v. Cardoza-Fonseca*, 480 U.S. 421, 431-48, 107 S.Ct. 1207, 1212-22, 94 L.Ed.2d 434 (1987). Following this circuit's traditional approach as developed in *Northern Natural Gas Co. v. Grounds*, 441 F.2d 704 (10th Cir. 1971), and followed in *Aulston*, 915 F.2d at 589-599, we use traditional tools of statutory construction to investigate whether inclusion of CBM in the coal reservation was either specifically intended by Congress, or is consistent with Congress' general legislative purpose in enacting the 1909 and 1910 Acts.

B. Specific Congressional Intent

Congress' specific intent to include or exclude CBM in its reservation of coal must be judged from the perspective of Congress at the time of enactment of the 1909

and 1910 Acts. From that perspective, the Amoco defendants argue that we can easily discern Congress' specific intent. First, they argue that in 1909 coal was typically defined as a solid rock, without specific mention of gaseous constituents. Amoco Br. at 17; *Amoco Prod. Co.*, 874 F.Supp. at 1153. Second, they contend that in 1909 Congress was aware of CBM as a hazardous gaseous byproduct of coal and could specifically have retained the CBM by inserting the word "gas" in the mineral reservation had it so wished. From these facts defendants conclude that Congress' use of the word "coal" in its mineral reservation was not inadvertent, and that Congress specifically chose to reserve only solid rock coal.[5]

We might agree with Amoco if we were construing a contemporary reservation in the light of the present commercial value of CBM and the relative ease of its extraction. But our task is to try to discern the intent of Congress almost three quarters of a century ago. Even if Congress intended to retain only solid rock coal, in 1909 Congress may have considered CBM to be part of that solid coal. CBM is generated as part of the chemical and physical processes which convert carbon-rich sediments into solid coal (coalification). J. Hovey Kemp & Kurt M. Petersen, *Coal-Bed Gas Development in the San Juan Basin: A Primer for the Lawyer and Landman*, 1988 ROCKY MTN. ASS'N OF GEOLOGISTS 257, 259. In this respect, CBM is like other hydrocarbon gases which are similarly generated by the compaction and chemical alteration of carbon-rich source rock. But, unlike hydrocarbon gases which are mobile (fugacious) and are typically found trapped in reservoir rocks distant from their source rocks, the CBM at issue in this case is still trapped in the rock with which it was generated. It is trapped by

[5] The federal defendants have adopted the Amoco defendants' arguments on the issue of CBM ownership. Federal Br. at 28.

adsorption[6] "on the internal surface of micropores," and as "free gas in cracks and fractures."[7] *Ownership of and Right to Extract Coalbed Gas in Federal Coal Deposits*, 88 Interior Dec. 538, 540 n. 11 (1981) (quoting Deul, *Methane Drainage from Coal Beds, A Program of Applied Research*, 60 ROCKY MTN. COAL MINING INST. 13 (1964)). CBM which is trapped in coal *cannot* migrate away from the coal.

Furthermore, although CBM in a gaseous state can be produced from coal, prior to that production most CBM is not, *in situ*, a "gas" within the typical physical definition of the term.[8] It is not sufficiently like other natural gases for us to conclude that Congress unambiguously intended the owners of other natural gases to also own CBM associated with the reserved coal. The adsorbed component of CBM is molecularly bound to the coal and cannot be released without an alteration in the physical state of the coal. In fact, release of either adsorbed or fracture-trapped CBM requires production techniques which often cause significant damage to the coal.[9] CBM ownership,

[6] Adsorption is "adhesion in an extremely thin layer of molecules . . . to the surfaces of solid bodies or liquids." MERRIAM WEBSTER'S COLLEGIATE DICTIONARY 16 (10th ed.1993).

[7] At issue here is the ownership of CBM trapped in and produced from the coal reservoir. We do not address ownership of CBM generated by the coalification process that may have migrated away from the coal into adjacent non-coal strata.

[8] A gas is "a fluid substance with the ability to expand indefinitely." THE RANDOM HOUSE WEBSTER'S COLLEGE DICTIONARY 550 (1995). CBM which, as here, cannot expand without inducing a physical change in its reservoir, cannot be considered a natural gas in the typical sense.

[9] Adsorbed CBM, which comprises most of the "gas" within coal, can be economically produced only by techniques which artificially induce changes in the coal reservoir. *See, e.g.*, Jeff L. Lewin et al., *Unlocking the Fire: A Proposal for Judicial or Legislative Determination of the Ownership of Coalbed Methane*, 94 W. VA. L.REV. 563, 573, 576-583 (1992) (discussing vertical-boreholeinduced pressure changes, hydrofracturing, and horizontal drilling).

therefore, cannot be disposed of by the simple tautology that gas is gas. We are concerned not with the physical state of the substance as gas at the surface when it is produced, but rather with its physical state prior to extraction, as trapped in coal. Even assuming Congress specifically intended to retain only solid rock coal, that solid rock coal is the source for and traps CBM. Because CBM is an integral part of the coal, Congress could certainly have considered it part of the solid rock.[10] Indeed, it seems to us quite unlikely that Congress, if it had considered the matter, would have reasoned, "We want the Government to hold on to the solid bituminous core of these coal deposits, but we make no claim to the thin layer of molecules of CBM which coats the surfaces."

Moreover, we disagree that a specific intent to retain only solid rock coal was evinced by Congress' awareness that CBM was occasionally released as a hazardous by-product of coal mining. CBM was not readily severable from coal in 1909 even though it is now "potentially severable" through application of advanced drilling and production technologies.[11] *See* Kemp & Petersen, *supra*, at

[10] In fact, by 1909, scientists understood that gas within coal was a constituent of coal which was generated by the coalification process. *See* Rollin T. Chamberlin, *Notes on Explosive Mine Gases and Dust*, U.S. Geol. Surv. Bull. 383, H.R. Doc. No. 59-823, at 16 (1909) ("The ultimate source of the gases [within coal] . . . has arisen from the slow decomposition of organic matter as a by-product in the process which has converted vegetable humus into coal.").

[11] Congress almost certainly knew in 1909 that gas could be extracted from coal. The coal degasification practiced in 1909 was, however, a different process than the CBM drilling at issue in this case. Coal degasification required mining and extraction of coal, then releasing the gas by mechanically crushing the coal, Chamberlin, *supra* note 10, at 17, or heating it, LARRY L. ANDERSON & DAVID A. TILLMAN, SYNTHETIC FUELS FROM COAL § 3.1.1, at 31 (1979). Because these processes of degasification necessarily resulted in damage to or destruction of the coal, they could only be employed by the owner of the coal. Accordingly, the value of the

261 ("Due to technical advances and changes in the world energy supply, the recovery and utilization of coalbed gas now appears to be more feasible."). It is not reasonable to impute to Congress a desire to retain only solid rock coal constituents and to convey gaseous coal constituents when CBM is an integral component of coal and in 1909 there appears to have been no technology by which a patent holder could extract CBM from coal without damaging or destroying the coal. Because no effective means existed in 1909 to remove CBM leaving the coal behind, CBM physically trapped in coal was necessarily retained with the coal reservoir.

The fact that CBM could not be commercially extracted from coal in 1909 indicates to us it is inappropriate to conclude that Congress intended a specific result one way or the other regarding CBM by its use of the word "coal." Rather, we conclude that where the commercial value of CBM was unappreciated at the time of the enactment, the text of these acts gives us no particular indication of Congress' *specific intent* with regard to that asset. *See United States v. Union Oil Co. of California*, 549 F.2d 1271, 1273 (9th Cir.1977) ("Congress was not aware of geothermal power when it enacted the Stock-Raising Homestead Act in 1916; it had no specific intention either to reserve geothermal resources or to pass title to them."); *Northern Natural Gas*, 441 F.2d at 714-15 (no specific intent to exclude helium will be inferred where lessors neither knew of presence nor appreciated

gas extracted necessarily belonged to the coal owner. CBM drilling, on the other hand, for the first time allows CBM to be released from coal without bringing large volumes of coal to the surface. The technique is typically employed where the coal is deeply buried and thinly bedded and cannot be economically mined. The advent of the drilling technologies employed today to extract CBM while leaving most of the coal relatively undisturbed, *cf.* Lewin, *supra* note 9, at 593-597 (the primary concern with CBM drilling is *in situ* damage to coal reserves), creates an apparent conflict in ownership of CBM that did not exist in 1909 and 1910.

value of helium gas); *cf. Aulston*, 915 F.2d at 594, 599 (rejecting argument that use of "gas" in mineral reservation evinced a specific congressional intent to exclude carbon dioxide from a gas reservation, when inclusion comported with general intent of statute and value of carbon dioxide was not appreciated at time of mineral reservation).

We are thus unable to conclude that Congress formed a specific intent to convey CBM as a gas given the uncertainty that Congress viewed CBM as a component distinct from solid rock coal, knew CBM was severable, knew that it had a value, and purposefully chose to reject that value. As a consequence, we are persuaded that the 1909 and 1910 Acts are ambiguous with respect to Congress' specific intent regarding CBM. *Cf. Western Nuclear, Inc.*, 462 U.S. at 56, 103 S.Ct. at 2229-30 (noting that the term "mineral" is ambiguous with respect to congressional intent to reserve gravel as a mineral). In the absence of specific congressional intent, we look at the general purpose of the statute and the historical context in which it was enacted to determine congressional intent. *Aulston*, 915 F.2d at 598. "General intent should be discovered . . . by considering the purposes of the grant in terms of enjoyment of the rights created." *Northern Natural Gas*, 441 F.2d at 714. "In our opinion general intent is closer to original intent than is specific intent which blossoms when a component previously regarded as an impurity becomes valuable." *Id.* at 715.

C. General Congressional Intent

"In interpreting the relevant [statutory] language . . . we look to the provisions of the whole law, and to its object and policy." *Aulston*, 915 F.2d at 589; *see also United States v. Colorado*, 990 F.2d 1565, 1575 (10th Cir.1993). "[W]e look at not only the statute itself but also at the larger statutory context. We may ascertain the intent of Congress through statutory language and

legislative history." *Utah v. Babbitt*, 53 F.3d at 1148 (citations omitted).

1. History

To understand the general congressional intent behind the 1909 and 1910 Acts, we review the historical context in which they were enacted, including the history of the Southern Ute Tribe's acquisition of its reservation lands and the United States' reservation of the coal it ultimately conveyed to the Tribe. We begin in the latter half of the nineteenth century with the formation of the Southern Ute Indian Reservation.

The Ute Indian Reservation was established in 1864, when the Uncompahgre, White River and Southern Utes "exchanged their aboriginal lands in New Mexico, Utah, and Colorado for . . . approximately 15.7 million acres . . . within Colorado." *United States v. Southern Ute Tribe or Band of Indians*, 402 U.S. 159, 162, 91 S.Ct. 1336, 1338, 28 L.Ed.2d 695 (1971). The reservation did not long remain intact. In 1874, 3.7 million acres of the reservation were ceded to the United States upon discovery of mineral resources on reservation land. *Id.* In 1880, the remaining reservation land was ceded to the United States in return for individual allotments and "shares in the proceeds of unallotted land sales." *Id.* at 164, 91 S.Ct. at 1339 (quoting *United States v. Southern Ute Tribe or Band of Indians*, 191 Ct.Cl. 1, 423 F.2d 346, 350 (1970)). The Uncompahgre and White River Utes left the reservation before 1882. *Id.* at 162, 91 S.Ct. at 1338.

After the cession of reservation land, the United States opened the ceded, non-allotted reservation to homesteading and mineral exploration under the terms and conditions of a variety of federal statutes. *Amoco Prod. Co.*, 874 F.Supp. at 1148 (citing the Homestead Act of 1862, 43 U.S.C. §§ 161 *et seq.* (repealed 1976), the Coal Lands Act of 1873, 17 Stat. 607, and the Mining Law of

1872, 30 U.S.C.A. § 22). At that time, "the disposition of land owned by the United States depended upon whether it was classified as mineral land or nonmineral land, and title to the entire land was disposed of on the basis of th[at] classification." *Western Nuclear, Inc.*, 462 U.S. at 47, 103 S.Ct. at 2225. Because the United States Geological Survey had insufficient resources to evaluate the mineral character of each land parcel before patent issuance, it often depended on the attestation of a patent applicant to determine the character of his land. *Id.* at 48 n. 9, 103 S.Ct. at 2225 n. 9. Although this honor system for patent evaluation inevitably led to considerable abuse, agricultural settlement and mineral exploration of reservation lands and other areas in the western United States proceeded for several decades under this system.

In 1906, President Roosevelt withdrew from homesteading or mineral patenting approximately 64 million acres considered to be valuable for coal resources, including the ceded, non-allotted Ute Reservation lands. *Id.* at 48-49, 103 S.Ct. at 2225-26 (citing 41 CONG. REC. 2615 (1907)). Two concerns drove the withdrawal of coal lands: first, the government wished to end the issuance of patents in reliance on an entrant's attestation of the mineral character of the land; and second, the government wished to encourage optimal land use by ensuring that lands valuable for mineral resources would not be held unavailable for mineral exploration by homesteading claims. *Id.* In his Sixth Annual Message to the nation, President Roosevelt explained that the withdrawal was necessary to preserve ownership of coal resources in the United States and to ensure price control of coal and disposition of the coal resources "under conditions which would inure to the benefit of the public as a whole." PRESIDENT THEODORE ROOSEVELT, SIXTH ANNUAL MESSAGE (Dec. 3, 1906), *reprinted in* XV THE WORKS OF THEODORE ROOSEVELT 363 (1926).

The 1906 withdrawal included lands on which the process of homesteading (holding the land for a term of

years in agricultural use in return for a land patent) had begun. Homesteaders who had entered the land in good faith, believing the land to be of non-mineral character, were disenfranchised by the withdrawal. To remedy that disenfranchisement while preserving the value of coal for future use of the United States, Congress enacted the 1909 Act. That act permitted existing good faith agricultural entrants whose land had been subject to the 1906 withdrawal to receive patents for those lands subject only to a "reservation to the United States of all coal in said lands." 30 U.S.C. § 81. In 1910, Congress enacted a similar statute for the protection of prospective agricultural entrants to federal lands. Under the protection of these Acts, the Amoco defendants' predecesors in interest claimed patents to land subject only to the reservation of coal in the United States.

Homesteading and mineral exploration proceeded under these statutes until 1934, when Congress changed its policy toward Indian Tribes and passed the Indian Reorganization Act (IRA), 25 U.S.C. §§ 463-479, which restored to tribal ownership some lands previously taken by the federal government. Congress provided that "[t]he Secretary of the Interior, if he shall find it to be in the public interest, is authorized to restore to tribal ownership the remaining surplus lands of any Indian reservation opened before June 18, 1934," subject to any outstanding rights or claims. *Id.* § 463(a). In 1938, pursuant to the 1934 Act, equitable title to coal held by the federal government on the Southern Ute Reservation was returned to the Tribe, subject to outstanding homestead patents. *Amoco Prod. Co.*, 874 F.Supp. at 1151.

2. Analysis

With this background, we turn to the general intent behind the 1909 and 1910 Acts. Defendants argue and the district court agreed, *Amoco Prod. Co.*, 874 F.Supp. at 1155-59, that, in attempting to preserve coal lands for the benefit of the public as a whole and to remedy the

negative impacts of the 1906 land withdrawals, Congress specifically considered and rejected a broad reservation of all minerals. From that rejection, defendants contend, we should infer that Congress knowingly chose the most narrow possible meaning of coal. Defendants rely on a passage of debate between a member of the House of Representatives from Texas and the Chairman of the Committee on Public Lands concerning the intended mineral reservation:

> Mr. STEPHENS of Texas. Could the gentleman better arrive at what he desires by only patenting the surface of the land and *reserving all minerals, precious and otherwise?*
>
> Mr. MONDELL. That has been discussed at some length, and *the Committee on Public Lands is not of the opinion that that ought to be done.* We believe this is quite a sufficient departure from the past practice of the Government. The lands which this legislation will affect are lands which the department has claimed contain some *coals* of value.

43 CONG. REC. 2504 (1909) (emphasis added). Even bearing in mind the admonition that legislative history should be treated cautiously, *Exxon Corp. v. Lujan*, 970 F.2d 757, 761 (10th Cir.1992), it is clear that Congress recognized in 1909 it had the option to reserve "all minerals" and rejected that option.

Congress' rejection of an "all minerals" reservation, however, does not inform us about Congress' intent regarding the extent of the reservation of a single substance, "coal." Moreover, the quoted exchange between Representatives Stephens and Mondell does not bear the weight defendants would have us give it because the Committee affirmatively considered and rejected several other options, including no reservation of coal. Aplt.'s App., vol. VI at 1275, *Hearings on Coal Lands and Coal-Land Laws of the United States Before the House Committee on Public Lands*, 59th Cong., 2d. Sess. 17 (Dec. 17, 1906) (here-

inafter *Hearings*) (statement of Edgar E. Clark) (considering the use of government-imposed railroad rates to retain control of coal supply). The Committee also discussed and rejected the possibility of retaining only ownership of coal which was marketable in 1907. Aplt.'s App., vol. VI at 1286, *Hearings*, at 15 (Jan. 9, 1907) (statement of Marius R. Campbell); *id.* at 1281 (noting that the western coals at issue in this case were not mineable at that time and were "inferior to the eastern coals, particularly from a steaming and coking standpoint").

Rather than adopt any of those options, Congress chose to reserve "all the coal." *Id.* at 1287 (The "only really effective way to retain the balance of the coal in the public domain in public ownership . . . [was to] reserve the coal under the surface of all of the land. That would effectively retain in public ownership all the coal."). In so doing, the Committee was specifically informed it would retain coal that was not presently valuable, but which could become valuable in the future. *Id.* at 1281 ("[W]hat may not be coking [valuable] coal to-day may be coking coal to-morrow; because there are improvements going on."); *id.* at 1282 ("these [coals] may have a much greater value in the future").

It is apparent from the legislative history of the 1909 and 1910 Acts that Congress understood it had the option to reserve to the United States only coal having current economic value, and rejected that narrow mineral reservation. Congress knew there was indeterminate potential value in the reserved coal and intended to secure that value for the United States.[12] Rather than indicating a limited reservation of coal to the United States, the legislative history suggests that Congress adopted an in-

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[12] Moreover, we cannot believe that Congress would have countenanced ceding CBM to surface patentees, *see infra* note 13, knowing that degasification at the time would have involved damage to and possibly destruction of the very resource sought to be reserved. *See supra* note 11.

terpretation of coal which encompassed both the present and future economic value of coal, including value that could only be realized through advances in technology such as those which drive the present day exploration for CBM.

Congress' broad general intent and the absence of a clear conveyance of CBM to the surface patentees,[13] coupled with the principle of statutory construction that resolves ambiguity in favor of the sovereign, persuades us that CBM was reserved to the United States.

3. Related Statutes

Our conclusion that the reservation of coal should include CBM is buttressed by the interpretation given to analogous statutory mineral reservations. The same principle we rely on here, that ambiguity or uncertainty in the terms employed in land grants should be resolved in favor of the government, has been a subtext in the interpretation of many similar statutes reserving minerals to the United States.

In 1914, Congress enacted the Agricultural Entry Act, 30 U.S.C. §§ 121-125 (hereinafter the 1914 Act), reserving "phosphate, nitrate, potash, oil, gas, or asphaltic minerals" to the United States, *id.* § 121. Then in 1916, Congress enacted the Stock-Raising Homestead Act, 43 U.S.C. §§ 291-301 (hereinafter the 1916 Act), which reserved to the United States "all the coal and other minerals," *id.* § 299. Uniformly, courts have treated these mineral reservations expansively. *Western Nuclear, Inc.*, 462 U.S. at 60, 103 S.Ct. at 2231-32 ("gravel is a mineral reserved to the United States in lands patented under" the 1916 Act); *Aulston*, 915 F.2d at 585 (reservation of "gas" in the 1914 Act includes carbon dioxide); *Union Oil Co.*, 549 F.2d at 1279 (geothermal energy in-

[13] "Surface patent" is used throughout this opinion to indicate the surface estate patented to agricultural entrants under the 1909 and 1910 Acts, which estate included all minerals other than coal.

cluded in 1916 Act's reservation of "all the coal and other minerals"); *Brennan v. Udall*, 379 F.2d 803, 804 (10th Cir.1967) (oil shale included in 1914 Act reservation of oil). Although the language employed in the 1914 and 1916 reservations is more expansive and admits more variety in type and character of mineral reservation than the language used in the 1909 and 1910 Acts, judicial interpretations of these statutes have reached for the outer limits of reasonable construction in favor of the sovereign. A particularly notable example is one court's classification of geothermal energy (hot water and steam) as a "mineral." *Union Oil Co.*, 549 F.2d at 1279. In fact, we have found no occasion in which a reservation of a mineral asset to the United States has been treated narrowly to exclude a newly appreciated value associated with that mineral; the cases cited above offer no support for doing so now.

In addition to the general principles of statutory construction on mineral reservations, we also have some specific guidance from Congress on the interpretation of the 1909 and 1910 Acts. In 1955, to aid exploration and extraction of uranium and other source materials[14] in coal reserved to the United States by the 1909 and 1910 Acts, Congress enacted legislation to control "Entry and Location on Coal Lands on Discovery of Source Material." 30 U.S.C. §§ 541-541i (hereinafter the 1955 Act). The 1955 Act granted to the patent holder of lands in which the United States reserved a coal interest the "exclusive right to mine, remove, and dispose of lignite [coal] containing . . . source material [uranium and other

[14] Source material, as used in the 1955 Act, means "uranium, thorium, or any other material which is determined by the Atomic Energy Commission . . . to be source material." 30 U.S.C. § 541e. Source material is used in production of special nuclear material; a mineral is classified as source material if the Atomic Energy Commission determines that the material is "essential to the production of special nuclear material" and that the classification is in the "interest of common defense and security." 42 U.S.C. § 2091.

similar minerals] . . . subject to the reporting and payment requirements of section 541." *Id.* § 541c. The right to extract coal to obtain uranium was granted for all federal coal lands, "*except*[] lands embraced within a coal prospecting permit or lease." *Id.* (emphasis added).

The Amoco defendants consider the legislative history of the 1955 Act relevant to our determination of CBM ownership. They quote a 1955 House Report which discusses the rights of surface patent holders who acquired their interests under the 1909 and 1910 Acts:

> The entryman or owner of any land, . . . with respect to which only the coal deposits have been reserved to the United States, heretofore has been presumed to have possessed fee simple title to all other minerals in the land, including valuable source minerals, regardless of the host material or the mode of occurrence.

H.R. REP. No. 84-1478 (1955), *reprinted in* 1955 U.S.C.C.A.N. 2992, 2996. Amoco argues this legislative history supports their contention that, in 1955, Congress recognized the right of surface patent holders to exploit minerals contained in coal, and therefore the right to exploit CBM must be similarly granted to surface patent holders.[15]

First, Amoco's assertion that the surface patent holder has the right to "all other minerals" begs the question of

[15] Congress' allocation of the right to extract uranium in coal cannot be fully equated to the CBM at issue in this case because uranium is not invariably included in coal as part of the coalification process and because the 1955 Act does not purport to apply to nonfederal lands. Congress' determination of the respective rights of the surface patent holder and the United States in the 1955 Act is nevertheless instructive in the case at bar. *See Andrus v. Shell Oil Co.*, 446 U.S. 657, 666 n. 8, 100 S.Ct. 1932, 1938 n. 8, 64 L.Ed.2d 593 (1980) ("[W]hile arguments predicated upon subsequent congressional actions must be weighed with extreme care, they should not be rejected out of hand as a source that a court may consider in the search for legislative intent.").

whether CBM is a mineral distinct from coal. Moreover, Amoco's interpretation of the legislative history of the 1955 Act is not the only interpretation the enactment will bear. We think the legislative history of the Act merely acknowledges a presumption that surface patent holders generally had the right to extract source minerals. The fact that Congress ultimately decided it must pass a statute to grant the surface patentees rights to uranium suggests that Congress did not believe the presumption extended to source minerals contained in federally owned coal. Moreover, Congress granted no right to extract uranium from coal where the United States had previously conveyed a coal lease. 30 U.S.C. § 541c. Congress' protection of existing coal leases also suggests that the 1955 Congress viewed the reservation of coal under the 1909 and 1910 Acts to encompass minerals such as uranium imbedded in coal.

The 1955 Act comports with a Congressional view that an imbedded mineral like uranium was part of the 1909 and 1910 Act coal reservations. That view applies with even greater force to integral components of coal like CBM, and if anything, convinces us that the 1955 Congress would resolve doubts regarding the 1909 and 1910 coal reservations, as we have here, in favor of the sovereign.[16]

[16] Amoco also relies on a 1933 House of Representatives' report to suggest that Congress has recognized dual ownership between the United States and agricultural patent holders when reserved minerals are found commingled with unreserved minerals. Amoco Br. at 23-24 (citing H.R. REP. No. 72-1938, at 2 (1933)). The House report and the subsequently enacted 1933 Act, which consolidated in the United States ownership of commingled sodium and potash, 30 U.S.C. § 124, do not particularly inform us about the 1909 and 1910 coal reservations, and certainly do not persuade us to ignore our mandate to resolve doubts and ambiguities in the 1909 and 1910 coal reservations in favor of the sovereign.

4. Summary

In summary, the direct legislative history of the coal lands acts indicates that Congress intended a reservation of coal that encompassed both the present and future economic value of coal. Congress was aware that full economic realization of that benefit would require advances in technology. Present day exploitation of CBM is a benefit of coal ownership that is consistent with Congress' general statutory intent. Given the limited value attributed to CBM in 1909 and 1910, we cannot infer that Congress intended to convey to the surface patent holder a component of coal which could not be severed from coal at the time of the statutes' enactments. In 1955, Congress itself recognized the supervening rights of coal owners in cases of dual mineral assets such as uranium and lignite. Lastly, courts have consistently construed mineral reservations in favor of the United States. These factors persuade us that Congress intended in the 1909 and 1910 Acts a broad definition of coal, and that CBM trapped in coal is included in the reservation of coal to the United States.[17]

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[17] The Tribe, the Amoco defendants, and the federal defendants have cited state court cases which have considered ownership of CBM. As interesting as these cases are (four of five deciding ownership of CBM is in the coal owner), they are not dispositive of the case at bar. The state cases construe CBM ownership in the context of common law deeds, which are negotiated conveyances with specific rules and presumptions of construction. These cases ultimately have little to offer in terms of our interpretation of Congressional intent in the 1909 and 1910 Acts. *See, e.g., NCNB Texas Nat'l Bank, N.A. v. West*, 631 So.2d 212 (Ala.1993) (coal owner has ownership rights of CBM contained in coal and gas owner had rights to any CBM which has migrated away from the coal reservoir); *Vines v. McKenzie Methane Corp.*, 619 So.2d 1305 (Ala. 1993) (ownership of CBM was included in grant of "all coal"); *Rayburn v. USX Corp.*, No. 85-G2661-W, 1987 U.S. Dist. LEXIS 6920 (N.D.Ala. Jul. 28, 1987) (coal owner, USX, is owner of right to explore for and to extract occluded CBM where grantor of deed retained only oil and gas rights); *United States Steel Corp. v. Hoge*, 503 Pa. 140, 468 A.2d 1380 (1983) (coal owner has right to CBM). *But cf. Carbon County v. Union Reserve Coal Co.*, 271 Mont. 459, 898 P.2d 680 (1995) (right to extract CBM is with holder of gas exploration rights).

At this juncture, our statutory interpretation is complete and we would normally conclude our analysis. But defendants raise one last issue regarding CBM ownership which demands our attention: the 1981 Department of the Interior Solicitor's Opinion.

D. 1981 Department of the Interior Solicitor's Opinion

In 1981, the Solicitor of the Department of the Interior promulgated an opinion entitled *Ownership of and Right to Extract Coalbed Gas in Federal Coal Deposits*, 88 Interior Dec. 538 (1981) (hereinafter Solicitor's opinion), in which the Solicitor construed the meaning of "coal" in the 1909 and 1910 Acts and concluded that "a reservation of 'coal' does not include coalbed gas." *Id.* at 549. Although the district court determined that the statutes were unambiguous and that no resort to agency interpretation was necessary, *Amoco Prod. Co.*, 874 F.Supp. at 1154, it nevertheless alternatively "grant[ed] deference to the 1981 Solicitor's opinion that Congress' use of the term coal does not include CBM gas," *id.* at 1160 (relying on *Chevron, U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 104 S.Ct. 2778, 81 L.Ed.2d 694 (1984)).

On appeal, defendants contend we must defer to the Solicitor's "long-standing administrative interpretation and implementation of statutes the Department of Interior administers." Federal Br. at 27; *see also* Amoco Br. at 43. Amoco argues as if *Chevron* deference were automatic, covering all kinds of agency expressions of policy and interpretation regardless of the decisionmaking process, whether prospective or retroactive, or whether concerned with public lands or private rights. The Tribe counters that the instant case is an adjudication of private

property rights and that the Solicitor's opinion is not entitled to *Chevron* deference because it was issued ex parte without the Tribe's involvement. We believe that the proper application of *Chevron* requires a discriminating analysis.

1. The Opinion

After it became apparent that commercial recovery of CBM was economically feasible, the Department of the Interior sought to expedite the development of CBM on federal land. Before development could begin, however, it was necessary to resolve the unsettled question of CBM ownership. In instances where the United States had reserved all minerals (including coal, oil and gas), the government clearly owned the CBM. Where the United States held only a partial mineral estate, proposed development of CBM on federal land required clarifying whether ownership of CBM vested in the United States through its reservation of coal under the 1909 and 1910 Acts or through its reservation of oil and gas under the 1914 Act. As a subsidiary matter, it was also necessary to determine whether the right to extract *federal* CBM should be granted via an oil and gas lease or through a coal lease.

In 1981, the Solicitor of the Department of the Interior wrote a letter to the Secretary of the Interior offering a legal opinion on these questions; the letter was subsequently promulgated without notice and comment as a Solicitor's Opinion. 88 Interior Dec. at 539. To resolve the question of CBM ownership, the Solicitor construed the meaning of "coal" in the 1909 and 1910 Acts. *Id.* at 541-545.[18] Although he acknowledged the general

[18] To determine whether federal rights to CBM resulted from federal ownership of coal or from federal ownership of oil and gas, the Solicitor began by noting the current interest in developing this resource in light of the recently achieved technical feasibility. He then examined the physical characteristics of coal and CBM.

canon that land grants are construed in favor of the sovereign and the fact that CBM had only recently become commercially severable from coal, the Solicitor nevertheless concluded that "a reservation of 'coal' [under the 1909 and 1910 Acts] does not include coalbed gas." *Id.* at 549. Accordingly, he determined that CBM interests were vested in the federal government through its oil and gas reservations. *Id.*

In making this determination, the Solicitor did not address the impact of his decision on the interests of private parties who had acquired ownership of coal, oil or gas by federal land patent prior to the issuance of the 1981 opinion, nor was any notice of the pending decision given to such owners.[19] If this opinion were accorded

Ownership of and Right to Extract Coalbed Gas in Federal Coal Deposits, 88 Interior Dec. 538, 540 (1981). Next he reviewed the history of coal land withdrawals and coal reservations. *Id.* at 540-41. He observed that in 1909 and 1910 coalbed gas was both a nuisance and a hazard. *Id.* at 541. He relied on the colloquy between Congressman Mondell and Stephens to indicate the limited nature of the coal reservation, and concluded that the statutory language of the coal lands Acts and the legislative history "belie the argument" that Congress intended to reserve any mineral other than coal. *Id.* at 542. The Solicitor used subsequent legislation (the 1955 and 1933 Acts) and a case considering a common law deed to support his conclusion. *Id.* at 542-44.

[19] We note that after the issuance of the 1981 Solicitor's opinion at issue in this case, the Department of the Interior promulgated an opinion regarding the rights to CBM on the Jicarilla Apache Reservation. *Rights to Coalbed Methane Under an Oil & Gas Lease for Lands in the Jicarilla Apache Reservation*, 98 Interior Dec. 59 (1990). Although the 1990 opinion relies on the 1981 Solicitor's opinion for its statutory interpretation, and thus has little to offer in terms of guidance on the 1909 and 1910 Acts, it does represent the first time Interior attempted to apply the reasoning of the 1981 Solicitor's opinion to Indian land. Some important differences exist between the Jicarilla opinion and this case. The Jicarilla Apache Tribe owns all relevant mineral resources on its reservation (coal, oil and gas). Aplt.'s App., vol. IX at 2026. Thus, the determination that an oil and gas lease is an effective instrument to lease CBM

Chevron deference, it would have a retroactive impact on private rights conveyed by the government some seventy years earlier. The question we face is whether this is the sort of decision *Chevron* is meant to enshrine.[20]

2. *Chevron* Deference

In *Chevron,* the Supreme Court considered whether an agency construction of a statutory term promulgated as an *agency legislative rule* should be binding on courts

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gas is merely an interpretation of a federal lease form, not a final determination of Tribal property rights. We accept that an oil and gas lease executed by the owner of CBM, in the absence of a specific reservation of CBM, *could* be an effective instrument to convey the right to drill and produce CBM. *Shoshone Indian Tribe v. Hodel,* 903 F.2d 784, 787 (10th Cir.1990) ("The Secretary is delegated the authority to define the terms of the leases and to 'make such rules and regulations as may be necessary for the purpose of carrying the provision of [the] section into full force and effect . . . .'" (quoting The Indian Mineral Leasing Act of 1938, 25 U.S.C. § 396)).

[20] Although we address the issue of *Chevron* deference, we note that neither Amoco, the oil industry at large, nor the Department of the Interior have previously assumed the Solicitor's opinion resolved private CBM property rights, as Amoco now advocates it should. Internal Amoco memoranda indicate Amoco has been aware since 1980 that ownership of CBM was unsettled, Aplt.'s App., vol. VII at 1412 (Amoco legal opinion on CBM ownership), and has known since 1982 that the Solicitor's opinion was not a binding determination of property rights, *id.* at 1429-1441 (Amoco business risk assessment). Amoco was also in receipt of a 1985 title opinion which concluded that the determination of CBM ownership based on the Solicitor's opinion was only "tentative" because the opinion was "subject to revision and revocation." *Id.* at 1444. Commentators on the issue of CBM ownership have also noted the non-binding nature of the Solicitor's opinion. J. Hovey Kemp & Kurt M. Petersen, *Coal-Bed Gas Development in the San Juan Basin: A Primer for the Lawyer and Landman,* 1988 ROCKY MTN. ASS'N OF GEOLOGISTS 257, 262. Similarly, after the issuance of the 1981 Solicitor's opinion, in an internal letter the Bureau of Indian Affairs, a branch of the Department of the Interior, recognized that the Southern Ute Tribe had a claim to ownership of CBM. Aplt.'s App., vol. IX at 2024.

and citizens. *Chevron,* 467 U.S. at 840, 104 S.Ct. at 2780. The Court stated that to determine whether deference was due the agency's statutory construction, a court must first determine whether Congress has "directly spoken to the precise question at issue;" if so, an agency must follow the clearly expressed intent of Congress. *Id.* at 842-43, 104 S.Ct. at 2781. "The judiciary [as] the final authority on issues of statutory construction . . . must reject administrative constructions which are contrary to clear congressional intent." *Id.* at 843 n. 9, 104 S.Ct. at 2781 n. 9. We have already held *supra* that Congress did not define the word coal in the 1909 and 1910 Acts and that Congress did not speak directly to the ownership of CBM.[21]

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[21] We also concluded *supra* that Congress' general intent regarding the 1909 and 1910 coal reservation is clear: Congress intended a broad definition of coal which could encompass CBM. Some courts have indicated that Congressional intent sufficient to satisfy the first step of *Chevron* can be discerned using traditional methods of statutory construction. *INS v. Cardoza-Fonseca,* 480 U.S. 421, 446-448, 107 S.Ct. 1207, 1221-22, 94 L.Ed.2d 434 (1987); *United States v. LaBonte,* 70 F.3d 1396, 1406 (1st Cir.1995) ("When the plain meaning of a law is not readily apparent on its face, the next resort is to the traditional tools of statutory construction—reviewing legislative history and scrutinizing statutory structure and design—in an effort to shed light on Congress's intent."), *rev'd on other grounds* —— U.S. ——, 117 S.Ct. 1673, 137 L.Ed.2d 1001 (1997) (concluding statute unambiguous); *see also* Cass R. Sunstein, *Law and Administration after* Chevron, 90 COLUM. L.REV. 2071, 2109 (1990) (arguing that general Congressional intent garnered from the "legislative history or background of the statute, or from understandings about *likely legislative desires,*" is sufficient to foreclose reliance on a contrary agency statutory interpretation) (emphasis added). *But see Cardoza-Fonseca,* 480 U.S. at 454-55, 107 S.Ct. at 1224-25 (Scalia, J., concurring) (suggesting that Justice Stevens, the author of *Chevron,* writing for the Court in *Cardoza-Fonseca* misinterpreted *Chevron* when suggesting that traditional tools of statutory construction can be used to supplant an agency statutory interpretation if the agency has otherwise appropriately been delegated authority to make the interpretation).

When Congress has not addressed "the precise question at issue," an agency requesting *Chevron* deference to its statutory interpretation must show that it has been delegated authority to address the question. *Adams Fruit Co. v. Barrett*, 494 U.S. 638, 649, 110 S.Ct. 1384, 1390, 108 L.Ed.2d 585 (1990) (a "precondition to deference under *Chevron* is a congressional delegation of administrative authority"); *Homemakers North Shore, Inc. v. Bowen*, 832 F.2d 408, 411 (7th Cir.1987) ("[T]he first question in determining the deference appropriate to the agency's construction is whether Congress has transferred discretion [to interpret the statute] to the agency.").

a. Delegation of Authority

The Department of the Interior has been expressly delegated authority over public lands. *See* 43 U.S.C. §§ 2, 1457; *Best v. Humboldt Placer Mining Co.*, 371 U.S. 334, 336, 83 S.Ct. 379, 382, 9 L.Ed.2d 350 (1963) (Interior "has been granted plenary authority over the administration of public lands, including mineral lands."). As part of that authority, Interior has the right to promulgate regulations and to determine "the validity of claims against the public lands." *Best*, 371 U.S. at 336, 83 S.Ct. at 382. "[S]o long as the *legal title remains in the government*," Interior clearly has the "'power, after proper notice and upon adequate hearing, to determine whether [a mining] claim is valid.'" *Id.* at 337, 83 S.Ct. at 383 (quoting *Cameron v. United States*, 252 U.S. 450, 460, 40 S.Ct. 410, 412, 64 L.Ed. 659 (1920)) (emphasis added); *Nequoia Ass'n v. Department of the Interior*, 626 F.Supp. 827 (D.Utah 1985) (Interior granted authority to determine validity of mining claims in National Parks under Mining in the Parks Act). For purposes of our analysis, we assume without deciding that Interior's power extends to the circumstances at issue here.[22]

[22] It is far from clear that the agency's authority extends to the issue presented in the case at bar. Even if the Solicitor's opinion represents a legitimate exercise of its authority over federal property, the lands in question in this case are not federal. If Interior once had jurisdiction over these lands, it no longer does. *Burke v. Southern Pac. R.R. Co.*, 234 U.S. 669, 697, 34 S.Ct. 907, 918, 58 L.Ed. 1527 (1914) (After a "'patent issued, that was the end of the jurisdiction of the Department over the lands.'" (quoting Secretary of the Interior)). The jurisdiction of the Department of the Interior after the issuance of land patents has always been viewed as limited:

> The limit of its authority is found in the acts of congress. It cannot grant land. . . . It cannot take away the property of one and give it to another. . . . Its jurisdiction terminates and its authority ceases when the land passes into private ownership and the title of the government is transmitted through the forms of law.

2 CURTIS H. LINDLEY, AMERICAN LAW RELATING TO MINES AND MINERAL LANDS § 664, at 1656 (Fred B. Rothman & Co. photo. reprint 1988) (3d ed.1914). A statutory delegation of authority would be required for Interior to have the power to re-assert jurisdiction over lands after patent issuance, and no such delegation has been made. *See, e.g., Foust v. Lujan*, 942 F.2d 712, 714-15 (10th Cir. 1991) (noting specific grant of authority to Interior by the Federal Land Policy and Management Act to correct mistakes of fact after patent issuance, but no grant of authority to correct other patent problems like mistakes of law).

In a situation similar to the present case, Congress conveyed by statute the United States' interest in uranium contained in coal reserved by the 1909 and 1910 Acts. 30 U.S.C. §§ 541-541i. Clearly, Congress neither expressly nor implicitly delegated power to Interior to determine that coal-ownership question. Moreover, Congress left to local courts resolution of disputes between patent holders and private parties (like the Tribe) who are successors in interest to the 1909 or 1910 Act coal reservations. H.R. REP. No. 1478 (1955), *reprinted in* 1955 U.S.C.C.A.N. 2992, 2996 ("[C]onflicts of interests [over the right to extract uranium and other source material from the coal] should be resolved by the parties concerned or, failing that, by the local courts and not through legislation."); *cf. Adams Fruit Co. v. Barrett*, 494 U.S. 638, 64[illegible], 110

b. The Format of Decisionmaking

To satisfy *Chevron*, the delegation of authority to form binding policy must include not only discretion to formulate interpretations but also discretion to utilize the par-

ticular format selected. *See* Robert A. Anthony, *Which Agency Interpretations Should Bind Citizens and the Courts?*, 7 YALE J. ON REG. 1, 4 (1990) (hereinafter Anthony) ("The touchstone in every case is whether Congress intended to delegate to the agency the power to interpret with the force of law in the particular format that was used."). After analyzing relevant Supreme Court cases, commentators Davis and Pierce have concluded "*Chevron* should be held to apply to the meanings agencies give statutes in all legislative rules and in most adjudications. [But][i]t should not be held to apply to agency pronouncements in less formal formats. . . ." 1 KENNETH C. DAVIS & RICHARD J. PIERCE, JR., ADMINISTRATIVE LAW TREATISE § 3.5, at 119 (3d ed.1994).

This circuit has denied *Chevron* deference to agency policies promulgated in formats other than legislative rules or adjudications. *Headrick v. Rockwell Int'l Corp.*, 24 F.3d 1272, 1282 (10th Cir.1994) ("[W]hile [an interpretive rule] may be entitled to some consideration in our analysis, it does not carry the force of law and we are in no way bound to afford it any special deference under *Chevron*.") (citations omitted). As we have unequivocally held, "[i]t is elementary administrative law that in order for [agency actions] to have binding force

S.Ct. 1384, 1390, 108 L.Ed.2d 585 (1990) (Where Congress has "expressly established the Judiciary and not the [administrative agency] as the adjudicator of private rights of action arising under the statute," the "precondition to deference under *Chevron* [of] a congressional delegation of administrative authority" is not met.).

Thus, although the Department of Interior clearly has authority to administer public lands, Interior has not demonstrated that it has been delegated authority to decide which lands are public, or to bind private parties after issuance of federal patents to its statutory interpretation. Because for other reasons we are not required to give *Chevron* deference to the Solicitor's opinion, we need not decide whether we would otherwise decline to defer to the Solicitor's opinion on the ground that Interior was not delegated authority over the kind of dispute we have here.

there are only two methods that an agency may use in formulating policy. It may establish binding policy either through rule-making procedures or through adjudications that create binding precedents." *Amrep Corp. v. FTC*, 768 F.2d 1171, 1178 (10th Cir.1985).[23]

Most circuits agree with our conclusion that *Chevron* deference is owed only to legislative rules and agency adjudications. *See, e.g., Motor Vehicle Mfrs. Ass'n v. New York State Dep't of Envtl. Conservation*, 17 F.3d 521, 534-35 (2d Cir.1994) (denying *Chevron* deference to statutory interpretation promulgated in agency advisory circular after concluding that the advisory circular was not a "regulation" for the purposes of the Act at issue); *Kelley v. E.I. DuPont de Nemours & Co.*, 17 F.3d 836, 841-42 (6th Cir.1994) (distinguishing *Chevron* deference granted to agency legislative rules from lesser deference accorded policy statements and interpretive rulings); *Satellite Broad. & Communications Ass'n of America v. Oman*, 17 F.3d 344, 346-47 (11th Cir.1994) (according *Chevron* deference to formally promulgated legislative rule after previously declining to accord deference

[23] It is sometimes difficult to distinguish legislative rules from policy statements. Davis and Pierce have described the differences in this way:

> There are three main differences between a legislative rule and a general statement of policy. First, except in specified circumstances, an agency cannot promulgate a legislative rule without first following notice and comment procedures; by contrast, APA § 553(b) specifically exempts general statements of policy from notice and comment procedures. Second, a valid legislative rule has the same binding effect as a statute; a general statement of policy has no binding effect on members of the public or on courts. A general statement of policy also is not judicially enforceable against an agency. . . . Third, many legislative rules are subject to potential judicial review before they are applied in a particular case; most general statements of policy are not subject to judicial review in the abstract.

1 KENNETH C. DAVIS & RICHARD J. PIERCE, JR., ADMINISTRATIVE LAW TREATISE § 6.2, at 228 (3d ed.1994) (internal citation omitted).

to similar policy decision); *Travelstead v. Derwinski*, 978 F.2d 1244, 1250 (Fed.Cir.1992) (noting general rule that agency pronouncements in formats less formal than legislative rules should be analyzed under *Skidmore v. Swift & Co.*, 323 U.S. 134, 140, 65 S.Ct. 161, 164, 89 L.Ed. 124 (1944), rather than *Chevron*); *Dalheim v. KDFW-TV*, 918 F.2d 1220, 1228 & n. 39 (5th Cir. 1990) (acknowledging application of *Skidmore* analysis to agency interpretive rules); *cf. Limerick Ecology Action, Inc. v. United States Nuclear Regulatory Comm'n*, 869 F.2d 719, 736 (3d Cir.1989) (an agency policy statement "is entitled to no greater deference than any other policy statement, i.e., none") (citations omitted); *Vietnam Veterans of America v. Secretary of the Navy*, 843 F.2d 528, 537 (D.C.Cir.1988) ("A binding policy is an oxymoron."). *See generally Atchison, Topeka & Santa Fe Ry. Co. v. Pena*, 44 F.3d 437 (7th Cir.1994) (en banc) (*Chevron* deference owed where agency has rulemaking authority and follows notice and comment process but not where agency has no rulemaking authority), *aff'd on other grounds*, —— U.S. ——, 116 S.Ct. 595, 133 L.Ed.2d 535 (1996) (holding text and structure of statute clear).[24]

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[24] Such confusion as exists within or between the circuits regarding *Chevron* deference is due informally promulgated agency statements can be attributed to the Supreme Court's loose invocation of *Chevron* terminology. *See generally* 1 DAVIS & PIERCE, § 3.6. Thus, the Court has sometimes cited *Chevron* in cases where *Chevron* deference was not actually granted. For example, in *Reno v. Koray*, 515 U.S. 50, 58-62, 115 S.Ct. 2021, 2026-27, 132 L.Ed.2d 46 (1995), the Court, citing both the *Chevron* and the *Skidmore* line of cases, see *infra* part II D 3, gave "some" deference to the Bureau of Prisons' statutory interpretation promulgated in an internal agency guideline. The Third Circuit subsequently used the Supreme Court's citation to justify granting *Chevron* deference to informally promulgated agency statutory interpretation. *Elizabeth Blackwell Health Ctr. for Women v. Knoll*, 61 F.3d 170, 182 (3d Cir.1995) (citing *Koray*, 515 U.S. at 58-59, 115 S.Ct. at 2026-27). But as Judge Nygaard pointed out in dissent, the Court in *Koray* only agreed with the agency interpretation because it was the most natural reading of the statute in question, not because *Chevron* mandated that it defer to an informally promulgated agency interpretation. *Id.* at 193-94 (Nygaard, J. dissenting).

According to the Department of the Interior's internal regulations, the Solicitor has authority:

> To issue final legal interpretations, in the form of M-Opinions published in *Decisions of the United States Department of the Interior*, on all matters within the jurisdiction of the Department, which shall be binding, when signed, on all other Departmental offices and officials and which may be overruled or modified only by the Solicitor, the Under Secretary, or the Secretary.

Aplt.'s App., vol. IX at 2069. A Solicitor's opinion is issued at the personal discretion of the Solicitor, without notice and comment, and can be overruled or modified at any time. *Id.* at 1982, 2069. The opinion at issue here, although presented as authoritative statutory construction, is nothing more than a public pronouncement that Interior will not assert the federal government's right to CBM under its reservation of coal; in that context, the opinion is a valid and useful document. As a simple policy statement, however, the Solicitor's opinion fails to provide the procedural protections required for *Chevron* deference to attach.

> [A] practice of routine acceptance for interpretations expressed in [informal] formats would, in abdication of judicial duties under *Marbury*, endow them with force of law where Congress did not intend them to have such force. By this process, the agency would bind the public without itself being bound by interpretations in these formats. And since these formats are exempt from APA public participation requirements, *an especially odious frustration is visited upon the affected private parties: they are bound*

> *by a proposition they had no opportunity to help shape and will have no meaningful opportunity to challenge when it is applied to them.*

Anthony, *supra,* at 57-58 (footnotes omitted and emphasis added).

Agencies can make law only in two formats, legislative rules and adjudications; the Solicitor's opinion was not promulgated with the procedural protections attendant to either format. *Amrep,* 768 F.2d at 1178. Accordingly, *Chevron* does not mandate that we give deference to the 1981 Solicitor's opinion.[25]

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[25] Defendants contend we must give *Chevron* deference to *this* Solicitor's opinion because we have given deference to *other* such opinions in the past. Cases in which we granted some deference, however, are readily distinguishable from this one. In *Aulston v. United States,* for example, we decided that a 1914 reservation of "gas" to the United States included carbon dioxide. *Aulston v. United States,* 915 F.2d 584, 585 (10th Cir.1990). The dispute arose between the United States, as holder of the gas estate, and the agricultural patentee. *Id.* The United States had granted an oil and gas lease, which it said included the right to explore for carbon dioxide gas. *Id.* at 587. The case came before this court as an appeal from an Interior Board of Land Appeals (IBLA) decision. *Id.* at 588. After conducting our own analysis of the 1914 statutes, we determined that a Department of the Interior interpretation of "gas" in the Mineral Lands Leasing Act (MLLA), a related statute, was due "some consideration" by the court, and that "some deference" to Interior's interpretation of the 1914 Act was appropriate in review of the IBLA decision. *Id.* at 596. In so holding, we rejected less formal Department of the Interior internal memoranda promulgated without the procedural protections of formal rulemaking or adjudications. *Id.* at 595 & n. 16. Even allowing that some deference was due the IBLA decision, we nonetheless were not persuaded that the decision was dispositive of the issue. We also relied on "[o]ther factors" to ensure that the interpretation of gas forwarded by the Department of the Interior was consistent with the purpose of the 1914 Act. *Id.* at 599. *Aulston* is thus a case which rejected informally promulgated statutory interpretations, involved federal rather than private land interests, and reached this

3. *Skidmore* Consideration

Although *Chevron* deference to the Solicitor's opinion is clearly not warranted, we do assess the merits of that opinion to the extent suggested in *Skidmore v. Swift & Co.,* 323 U.S. 134, 65 S.Ct. 161, 89 L.Ed. 124 (1944).

> We consider that the rulings, interpretations and opinions of the [agency], . . . while not controlling upon the courts by reason of their authority, do constitute a body of experience and informed judgment to which courts and litigants may properly resort for guidance. The weight of such a judgment in a par-

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court from an agency IBLA adjudication in which due process was afforded the participants.

In *Rocky Mountain Oil & Gas Ass'n v. Watt,* 696 F.2d 734, 737 (10th Cir.1982), a pre-*Chevron* case, we were concerned with a trade association's challenge to the Department of the Interior's interpretation of the Federal Land Policy and Management Act of 1976, issued initially in a Solicitor's opinion, as the Act related to oil and gas activity on federal lands under lease. Subsequently, the relevant parts of the Solicitor's opinion were formally promulgated in a Wilderness Inventory Handbook and in Interim Management Policy and Guidelines, both after notice and comment procedures. *Id.* at 739 n. 6. Moreover, unlike the case at bar, the United States was the owner of the mineral resource and the issue was only the regulation of that resource. In such circumstances, Interior unquestionably has the authority to regulate in such a manner and we would naturally defer to its reasonable interpretation. *See also Exxon v. Lujan,* 970 F.2d 757 (10th Cir.1992) (granting *Chevron* deference to Interior decision to issue permit for transport of carbon dioxide gas under the Mineral Leasing Act rather than under FLPMA in an appeal from an IBLA decision where due process was afforded participants and Interior unquestionably administers both statutes); *Brennan v. Udall,* 379 F.2d 803 (10th Cir. 1967) (recognizing mandatory deference to reasonable Department of the Interior conclusion that oil shale was included in reservation of oil to the United States, where the United States owned the reserved mineral interests, where the successor in interest to the agricultural patentee voluntarily submitted the dispute to Interior adjudication, where Interior's position on oil shale had been a matter of public record for fifty years, and where reservation of oil shale could have been contested prior to patent issuance).

> ticular case will depend upon the thoroughness evident in its consideration, the validity of its reasoning, its consistency with earlier and later pronouncements, and all those factors which give it power to persuade, if lacking power to control.

Id. at 140, 65 S.Ct. at 164; *see also Headrick*, 24 F.3d at 1282 (distinguishing between *Chevron* and *Skidmore* deference). There are several facets of this Solicitor's opinion, however, that impair its "power to persuade."

The Solicitor began his analysis of CBM ownership by noting the principle of resolving doubts in land grants in favor of the sovereign. While properly citing *Andrus v. Charlestone Stone Prods. Co.*, 436 U.S. 604, 617, 98 S.Ct. 2002, 2009-10, 56 L.Ed.2d 570 (1978), for this general principle on land grants, the Solicitor immediately qualified the application of that principle by asserting that land grants " 'are not to be so construed as to defeat the intent of the legislature, or to withhold what is given either expressly or by necessary or fair implication. . . .' " *Leo Sheep Co. v. United States*, 440 U.S. 668, 682-83, 99 S.Ct. 1403, 1411, 59 L.Ed.2d 677 (1979) (quoting *United States v. Denver & Rio Grande Ry. Co.*, 150 U.S. 1, 14, 14 S.Ct. 11, 15, 37 L.Ed. 975 (1893)). Apart from the basic premise that the principle of favoring the sovereign is involved when the legislative intent is in doubt, as here, the quoted qualification to the general rule arose in the context of grants under the Railroad Acts where the United States had offered land to railroads as an inducement to undertake track construction. *Id.* Since the situation involved here is not analogous to the facts of *Leo Sheep*, the principle of resolving doubts in favor of the sovereign applies with undiminished vigor. The Solicitor's conclusion on CBM ownership was determined without application of this governing canon.

The Solicitor further compromised his legal analysis by citing a state law case and suggesting that principles

of common law conveyances lend support to his conclusion regarding ownership of CBM. 88 Interior Dec. at 544. Not only was the particular case on which the Solicitor relied overruled on appeal, *United States Steel Corp. v. Hoge*, No. 78-682 (Pa. Ct. C.P., Greene Cty., March 24, 1980), *aff'd*, 304 Pa.Super. 182, 450 A.2d 162 (1982), *rev'd*, 503 Pa. 140, 468 A.2d 1380 (1983), but cases construing common law conveyances are inapposite to the case at bar as we have discussed *supra* note 17.

The Solicitor's position on the statutory reservation of CBM is also inconsistent with Interior statements on coal made contemporaneously with the 1909 and 1910 Acts. In 1909 the United States Geological Survey, a branch of the Department of the Interior, recognized that gas trapped with coal is generated by the coalification process. Rollin T. Chamberlin, *Notes on Explosive Mine Gases and Dust*, U.S. Geol. Surv. Bull. 383, H.R. Doc. No. 59-823, at 16 (1909). This contemporaneous statement acknowledging the shared genesis of coal and CBM belies the Solicitor's simplistic conclusion that in 1909 Congress believed that coal was a "solid rock." The Solicitor's narrow construction of coal in the 1909 and 1910 Acts is also inconsistent with the position Interior has taken in other similar mineral reservation disputes. As we have noted *supra*, Interior has typically construed such mineral reservations broadly. *See Aulston*, 915 F.2d at 595; *Brennan v. Udall*, 379 F.2d at 804; *see also* 1 CURTIS H. LINDLEY, AMERICAN LAW RELATING TO MINES AND MINERAL LANDS § 96, at 169 ("the word 'mineral,' as used in these various acts, should be understood in its widest signification"). On the few occasions in which a mineral term has been interpreted narrowly, courts have rejected those interpretations. *See, e.g., Western Nuclear, Inc.*, 462 U.S. at 42, 45, 103 S.Ct. at 2222-23, 2224 (rejecting Circuit Court's reliance on 1910 Department of the Interior determination that gravel is

not a mineral in favor of more recent expansive definitions of the term); *Union Oil Co.*, 549 F.2d at 1279-80 & n. 19 (rejecting Department of the Interior letter opinions suggesting that geothermal steam is not a mineral within the meaning of the Stock-Raising Homestead Act).

Moreover, the opinion has a number of factual limitations that militate against applying it here. The opinion is titled "*Ownership of and Right to Extract Coalbed Gas in Federal Coal Deposits.*" 88 Interior Dec. 538 (1981). It thus only purports to govern the disposition of present federal land interests, not the interests of private parties, such as are at issue in this case. The opinion also explicitly refuses to "warrant title to any oil and gas deposit." *Id.* at 549. The Solicitor thereby concedes that it is beyond the scope of the opinion to settle disputed property rights. It is only now, over a decade after the issuance of the opinion, that the Amoco defendants and the Department of the Interior suggest that private parties like the Tribe should be swept within the opinion's net and that their ownership of CBM was finally settled by its rationale. These assertions reach well beyond the scope of the original opinion.

Finally, we are convinced that the Solicitor's statutory interpretation of the 1909 and 1910 Acts is arbitrary. Even under the deference mandated by *Chevron*, "legislative regulations are [not] given controlling weight [if] they are arbitrary, capricious, or manifestly contrary to the statute." 467 U.S. at 844, 104 S.Ct. at 2782. "Review under the 'arbitrary and capricious' tag line . . . encompasses a range of levels of deference to the agency." *American Horse Protection Ass'n v. Lyng*, 812 F.2d 1, 4 (D.C.Cir.1987). "In . . . typical reviews, . . . we must consider whether the agency's decisionmaking was 'reasoned.'" *Id.* at 5 (citation omitted). An agency decision which is not reasoned persuades no more than it controls. Reasoned decisionmaking considers "relevant factors" and explains the "'facts and policy concerns.'" *Id.* (citation

omitted). While the Solicitor recognized that CBM is always present in solid rock coal and is only "potentially" but not naturally severable from coal, he nonetheless concluded that a reservation of coal excludes CBM. 88 Interior Dec. at 540. By failing to explain how Congress could have intended to convey a substance neither known to be valuable nor severable at the time of the enactments, the Solicitor's opinion failed to consider facts which might have significantly affected its decisionmaking. Reasoned decisionmaking does not omit without explanation potentially determinative factors.

Thus, we are not persuaded we should defer to the Solicitor's opinion.[26] The general congressional intent of the 1909 and 1910 Acts to reserve to the United States all the benefits of the coal resources controls the determination of CBM ownership. We hold that ownership of CBM, an integral component of coal inseverable at the time of the 1909 and 1910 enactments, is vested in the Tribe as owners of the coal resource.

III.

The district court concluded that the class action defenses to the Tribe's assertion of CBM ownership were mooted by its determination of CBM ownership in the Amoco defendants. *Amoco Prod. Co.*, 874 F.Supp. at 1161. Consequently, the court did not address the issues raised by the common defenses. *Id.* Because we reverse the district court on the threshold issue of CBM ownership, further proceedings will be required for resolution of these issues.

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[26] Although we hold that no deference is due the Solicitor's opinion as it relates to the determination of private CBM ownership, we do not address the degree of deference due the opinion as applied to ownership of federal land interests, to regulation and use of mineral assets on federal lands, or to interpretation of federal lease forms.

As we mentioned at the outset, the federal defendants joined with the Amoco defendants on the issue of CBM ownership. They also asserted that the statute of limitations contained in 28 U.S.C. § 2401(a) precludes the Tribe's claim of breach of fiduciary duty against them. Because the district court granted the federal defendants' motion for summary judgment on breach of fiduciary duty to manage the CBM based on its finding CBM ownership in the Amoco defendants, it never reached the statute-of-limitations issue as applied to the federal defendants. *Amoco Prod. Co.*, 874 F.Supp. at 1161. Further proceedings will also be required on this issue on remand.[27]

IV.

For all the foregoing reasons, we hold that the Southern Ute Indian Tribe, as successor in interest to coal reserved to the United States by the Acts of 1909 and 1910, is the owner of coal bed methane contained in that coal. Accordingly, we REVERSE the district court's grant of summary judgment in favor of defendants and remand for further proceedings consistent with this opinion.

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[27] To the extent the federal defendants' statute of limitations argument relies on the 1981 Solicitor's opinion to provide notice to the Tribe and to initiate the accrual of time, we note that such notice may be legally insufficient in light of our holding that the Solicitor's opinion is not binding on the issue of Tribal CBM ownership. *Limerick Ecology*, 869 F.2d at 735 (parties have no obligation to challenge an opinion which is non-binding); *Utah v. United States*, 624 F.Supp. 622, 625-26 (D.Utah 1983) (limitations period did not expire on State of Utah's claim against the United States where only notice to Utah was non-binding Department of the Interior Regional Solicitor's opinion that conflicted with Secretary of the Interior's letter opinion), *aff'd*, 780 F.2d 1515 (10th Cir. 1985), *rev'd on other grounds sub nom. Utah Div. of State Lands v. United States*, 482 U.S. 193, 107 S.Ct. 2318, 96 L.Ed.2d 162 (1987). We leave that determination to the district court as well.

APPENDIX C

THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF COLORADO

JUDGE LEWIS T. BABCOCK

Civil Action No. 91-B-2273

SOUTHERN UTE INDIAN TRIBE,
Plaintiff,

v.

AMOCO PRODUCTION COMPANY; SHIRLEY K. ADAMS; HENRY ASHWORTH; CARLA M. ASPAAS; ERIC K. ASPAAS; HELEN RUTH ASPAAS; LAURA BELLE ASPAAS; LETA M. ADKINS; RITA M. ADKINS; MAXWELL C. ANDERSON; EARL A. BARKER; HEIRS OF MAURICE C. BREEN, DECEASED; HORACE F. BUCHANAN; THE HEIRS OF HORACE BUCHANAN, DECEASED; GEORGE A. BUGG; CARBONE INVESTMENT COMPANY; JACK CARMACK; ROWLAND CARMACK; JOSEPH C. CIANCIO; WILLIAM KEMP CLARK; COLORADO NATIONAL BANK OF DENVER AS TRUSTEE OF THE GEORGE VETO TRUST; THE COLORADO NATIONAL BANK OF LONGMONT AS CONSERVATOR OF THE ESTATE OF GLADYS N. FRAZZINI, DECEASED; DOROTHY A. CORGIN; THE HEIRS OF KELLY COX, DECEASED; A.B. CROSBY; BARBARA CROSBY; DAVID CROSBY; JOHN CROW, JR.; MARGARET CROW; MANUEL CRUZ; LOUIS M. CUMMINS; FREDERICK E. DICKERSON; J. M. EAKES; ROBERT MCFERRAN EAKES; MARGARET ELLISON; SALLY M. ETTERBECK; MINNIE FLAKS; TILLIE FLAKS; CASSIO FRAZZINI; ADELE FROST; ROBERT GALBASIN; ABEL S. GALLEGOS; MONTEY GARNAND; RUBY GIBBS GOGGANS; CHRISTINE HAMILTON; HARDIN SIMMONS UNIVERSITY; THE HEIRS OF H. A. HARMON, DECEASED; KATHERINE FRANCES MCELVAIN HARVEY; THE SHAREHOLDERS OF HONDO

OIL & GAS CORPORATION; CHARLES KETTERING; FIDEL LUCERO; RICHARD C. MALCOMB; SUZANNE HEATH MANGES; KATHERINE B. MCELVAIN; MABEL MCELVAIN; THORNTON H. MCELVAIN, JR.; DOROTHY N. MCKELVEY; EDWIN L. MCKELVEY; R. FRANKLIN MCKELVEY; W.R. MCMAHON MCMURRY OIL COMPANY; W. CLAY MEREDITH CHARITABLE TRUST; THE HEIRS OF W.A. MONCRIEF, DECEASED; ROY E. MONTGOMERY, PERSONAL REPRESENTATIVE FOR THE ESTATE OF W. CLAY MEREDITH, DECEASED; THE HEIRS OF FORREST D. MILLER, DECEASED; THE HEIRS OF HELEN L. MILLER, DECEASED; THOMAS S. MORRISSEY; THOMAS J. MORRISSEY; EMIL MOSBACHER; EMIL MOSBACHER, III; JOHN DAVID MOSBACHER; R. BRUCE MOSBACHER; MYRA THERESA MOULDS; NORTH CENTRAL OIL CORPORATION; H.L. OLIVER; CLARA ONOFRIO; MARGARET C. PARGIN; HAROLD F. PAYNE, JR.; NEVILLE G. PENROSE; BEN M. PETERSON, JR.; FREDERICK PETROCCO; PHILLIPS PETROLEUM COMPANY; JAMES M. RAYMOND; THE HEIRS OF W.E. RENNIE, DECEASED; THOMAS C. ROMOLO; BENTON E. SMULLYEN; CLINTON I. SMULLYEN; WILLIAM STIRLING; THE HEIRS OF J.L. TATUM, DECEASED; ANNA CARLEO TOMEO; ERNEST TOMEO; TURNER SECURITIES; RICHARD W. TURNER, SR.; THE HEIRS OF GEORGE C. VANCE, DECEASED; ANTHONY H. VETO; JOSEPH F. WARE, JR.; ALBERT E. ZARLENGO; ANTHONY F. ZARLENGO; JOHN DOE AND ALL OTHER UNKNOWN PERSONS CLAIMING AN INTEREST IN THE MINERAL ESTATE LOCATED WITHIN THE N/2 OF SECTION 12, T33N, R8W, N.M.P.M., LA PLATA COUNTY, COLORADO; AMAX OIL & GAS, INC.; BOWEN/EDWARDS ASSOCIATES, INC.; CONOCO, INC.; FUEL RESOURCES DEVELOPMENT COMPANY; J.M. HUBER CORPORATION, OIL AND GAS DIVISION; MARKWEST ENERGY PARTNERS LIMITED; MCKENZIE METHANE CORPORATION; MERIDIAN OIL, INC.; MOBIL OIL CORPORATION; NATIONAL COOPERATIVE REFINERY ASSOCIATION; NORTHWEST

PIPELINE CORPORATION; PABLO OPERATING COMPANY; PALO PETROLEUM, INC.; PALO/EAGLE JOINT VENTURES; RICHMOND PETROLEUM, INC.; TIFFANY GAS COMPANY; WILLIAMS PRODUCTION COMPANY; UNION TEXAS PETROLEUM CORPORATION; JOHN DOE OIL COMPANY AND ALL OTHER UNKNOWN PERSONS OR ENTITIES CLAIMING LEASEHOLD WORKING INTERESTS OR OPERATING RIGHTS TO EXPLORE FOR, PRODUCE OR DEVELOP COALBED METHANE OR COAL CONSTITUENTS FROM COAL OR COAL STRATA RESERVED BY THE UNITED STATES IN PATENTS ISSUED UNDER THE ACT OF MARCH 3, 1909, OR THE ACT OF JUNE 22, 1910, FOR LANDS LOCATED WITHIN THE EXTERIOR BOUNDARIES OF THE SOUTHERN UTE INDIAN RESERVATION, AND WHICH ENTITIES HAVE NOT OBTAINED TRIBAL CONSENT TO AND FEDERAL APPROVAL OF SAID EXPLORATION, PRODUCTION OR DEVELOPMENT ACTIVITIES; MANUEL LUJAN, JR., SECRETARY OF THE UNITED STATES DEPARTMENT OF THE INTERIOR; THE UNITED STATES DEPARTMENT OF THE INTERIOR AND ITS SUBORDINATE AGENCIES; THE BUREAU OF INDIAN AFFAIRS; THE BUREAU OF LAND MANAGEMENT; THE MINERALS MANAGEMENT SERVICE; EDDIE F. BROWN, ASSISTANT SECRETARY OF THE BUREAU OF INDIAN AFFAIRS; DELOS CY JAMISON, DIRECTOR OF THE BUREAU OF LAND MANAGEMENT; SCOTT S. SEWELL, DIRECTOR OF THE MINERALS MANAGEMENT SERVICE; CLASS OF DEFENDANTS SITUATED SIMILARLY TO THOSE NAMED NON-GOVERNMENTAL DEFENDANTS WHO CLAIM OWNERSHIP OF AN INTEREST IN COALBED METHANE AND OTHER COAL CONSTITUENTS OR CLAIM THE RIGHT TO EXPLORE FOR, DEVELOP OR PRODUCE THOSE SUBSTANCES FROM COAL OR COAL STRATA RESERVED BY THE UNITED STATES IN PATENTS ISSUED UNDER THE ACT OF MARCH 3, 1909, OR THE ACT OF JUNE 22, 1910, FOR LANDS LOCATED WITHIN THE EXTERIOR BOUNDARIES OF THE SOUTHERN UTE INDIAN RESERVATION AND WHICH CLASS MEMBERS HAVE NOT OB-

TAINED TRIBAL CONSENT TO AND FEDERAL APPROVAL OF SAID INTERESTS OR RIGHTS.

Defendants.

AMENDED MEMORANDUM OPINION AND ORDER

Babcock, J.

The central issue in this case is whether in the Coal Lands Acts of 1909 and 1910 Congress reserved coalbed methane gas (CBM gas) in the United States when, under those acts, it reserved coal. I hold that Congress did not reserve CBM gas in the United States in the Coal Lands Acts of 1909 and 1910 and, consequently, Plaintiff, the Southern Ute Indian Tribe's (the Tribe) claim of equitable ownership to CBM gas in the lands at issue fails. Although this key question and its answer are simply stated, their basis necessarily requires considerable discussion.

The Tribe sued Amoco Production Company (Amoco), other oil companies, and individuals who claim various ownership interests to CBM gas contained in coal strata which previously had been reserved in the federal government under the Coal Lands Acts of 1909 and 1910, seeking declaration of ownership in the CBM gas, injunctive relief and damages based upon various theories including trespass and conversion. The Tribe also sued various federal governmental entities (federal defendants) claiming breach of fiduciary duty to manage the Tribe's trust resources. The federal defendants are Manuel Lujan, Jr., Secretary of the United States Department of the Interior, the Department of the Interior and its subordinate agencies, the Bureau of Indian Affairs, the Bureau of Land Management, the Minerals Management Service, Eddie F. Brown, Assistant Secretary of the Bureau of Indian Affairs, Delos Cy Jamison, Director of the Bureau of Land Management, and Scott S. Sewell, Director of the Minerals Management Service.

I certified a defendant class pursuant to Fed.R.Civ.P. 23(b)(2) to determine two issues (1) ownership of the CBM gas and (2) the existence and applicability to the ownership question of several defenses "common" to the non-federal defendant class comprised of all defendants except the federal defendants. Amoco was named as the defendant class representative. *See* Case Management Order No. 1. The federal defendants argue the Tribe's claim against them is barred by the applicable statute of limitations.

These issues are framed by cross-motions for summary judgment and the federal defendants' alternative motion to dismiss. The motions have been exhaustively briefed and argued. In view of my holding on the central question, I conclude that summary judgment should be awarded in favor of the defendant class and against the Tribe on the issue of CBM gas ownership. I further conclude that the federal defendants' motion for summary judgment should be granted on the issue of breach of fiduciary duty for the alleged failure to manage CBM gas as a tribal resource. Still remaining for future resolution are the Tribe's claims not dependent upon the ownership issue.

Jurisdiction is proper under 28 U.S.C. §§ 1331, 1361, and 1362. Under § 1362 the district court has original jurisdiction of the case brought by the Tribe against each of the defendants except the United States. Under 28 U.S.C. § 1505, the Court of Claims has jurisdiction to hear the Tribe's claim against the United States but this jurisdiction is not exclusive. *Manchester Band of Pomo Indians, Inc. v. United States*, 363 F.Supp. 1238, 1242-43 (N.D.Cal. 1973).

I.

Summary Judgment Standard

Fed.R.Civ.P. 56 provides that summary judgment shall be granted if the pleadings, depositions, answers to inter-

rogatories, admissions, or affidavits show that there is no genuine issue of material fact and the moving party is entitled to judgment as a matter of law. Fed.R.Civ.P. 56(c). The non-moving party has the burden of showing that there are issues of material fact to be determined. *Celotex Corp. v. Catrett*, 477 U.S. 317, 322 (1986). A party seeking summary judgment bears the initial responsibility of informing the district court of the basis for its motion, and identifying those portions of the pleadings, depositions, interrogatories, and admissions on file together with affidavits, if any, which it believes demonstrate the absence of genuine issues for trial. *Celotex*, 477 U.S. at 323; *Mares v. ConAgra Poultry Co., Inc.*, 971 F.2d 492, 494 (10th Cir. 1992). Once a properly supported summary judgment motion is made, the opposing party may not rest on the allegations contained in the complaint, but must respond with specific facts showing the existence of a genuine factual issue to be tried. *Otteson v. U.S.*, 622 F.2d 516, 519 (10th Cir. 1980); Fed.R.Civ.P. 56(e).

Burden of Proof

Fed.R.Civ.P. 56 ordinarily allocates the burden of proof in motions for summary judgment. But in matters relating to property rights of Indians, the burden of proof to be employed is defined in 25 U.S.C. § 194:

> In all trials about the right of property in which an Indian may be a party on one side, and a white person on the other, the burden of proof shall rest upon the white person, whenever the Indian shall make out a presumption of title in himself from the fact of previous possession or ownership.

If the requirements of 25 U.S.C. § 194 are met, the burden of proof is placed on the non-Indian party, in this case the non-federal defendant class. *Wilson v. Omaha Indian Tribe*, 442 U.S. 653, 669 (1979). Although the parties have expended considerable energy arguing the

applicability of § 194 to the ownership question, as will be seen, the ownership question turns as a matter of law on pure statutory construction.

II.

Background and History

The Tribe claims ownership of CBM gas found in the coal strata located on the Southern Ute Indian Reservation in southwestern Colorado. Approximately 200,000 acres within the exterior boundaries of the Tribe's reservation are held in fee by private persons and contain CBM gas now valued conservatively at $200,000,000. Presently, many non-Indian fee holders are receiving ownership benefits connected with the CBM gas in the form of revenues either from the sale of CBM gas or from oil and gas leases held by oil companies. An historical backdrop is necessary to understand the results obtained here.

In the second half of the 19th century, several tribes of Indians individually known as the Uncompahgre Utes, the White River Utes, and the Southern Utes, came to be known collectively by the United States as the Confederated Bands of Utes. At the urging of the United States, the Confederated Bands of Utes exchanged their aboriginal lands in New Mexico, Utah, and Colorado for a reservation of more than 15 million acres located entirely in *Colorado. United States v. Southern Ute Tribe*, 402 U.S. 159, 161-62 (1971); 15 Stat 619 (1868); 13 Stat 673 (1864). In 1874, after learning of valuable mineral deposits on the reservation, the United States urged, and the Confederated Bands of Utes approved, the Brunot Cession to the United States of 3.7 million acres located in the middle of the reservation. *Southern Ute*, 402 U.S. at 162; 18 Stat 36 (1874). As a result, the reservation boundaries changed and the Southern Utes came to occupy a strip of land approximately 15 miles wide and 110 miles long (referred to as Royce Area 617) at the southernmost portion of the reservation.

By 1880, the Southern Utes were alone on the reservation, the Northern Utes having relocated to Utah. Public outcry over the "Meeker Massacre" in which twelve non-Indians were killed led to the Act of 1880, ch. 223, 21 Stat. 199 (1880 Act), the central goal of which was the "termination of tribal ownership in the reservation lands . . . ." *Southern Ute*, 402 U.S. at 163. The 1880 Act provided that the Confederated Bands "cede to the United States all the territory of the present Ute Reservation in Colorado, except as hereinafter provided for their settlement." 21 Stat. 200 (1880). The provisions for settlement resulted in the removal of the Northern Utes to Utah and the settlement of the Southern Utes to unoccupied agricultural lands on the La Plata River in Colorado. In keeping with the express congressional purpose to destroy tribal structure, *see* 10 Cong. Rec. 2059, 2066 (1880), the Act also limited Indian land ownership to a specific amount of land allotted in severalty to individual Indians. The Act also provided that "all the lands not so allotted, the title to which is . . . released and conveyed to the United States, shall be held and deemed to be public lands of the United States and subject to disposal," for the financial benefit of the Utes. *Southern Ute*, 402 U.S. at 163-63.

The Supreme Court has left no doubt as to the meaning and effect of the 1880 Act. "The central feature of the Act of 1880 was the *termination of tribal ownership* in the reservation lands, and the limitation of Indian ownership to such lands as might be allotted in severalty to individual Indians." *Southern Ute*, 402 U.S. at 163. (emphasis added). All lands not allotted in severalty to individual Indians, then, including the lands in question here, were conveyed by the Utes, *Id.* at 169, to become public lands of the United States. 21 Stat. 203 (1880).

Over the next several decades, the ceded, non-allotted lands (surplus lands) that had previously made up the reservation were open to public entry and settlement

under the public land laws. 28 Stat. 677-78 (1895). These laws included the Homestead Act of 1862, 43 U.S.C. § 161 et seq. (repealed 1976), the Coal Lands Act of 1873, 17 Stat. 607, and the Mining Law of 1872, 30 U.S.C.A. § 22. Under these laws, entrymen could, upon satisfaction of certain patent requirements depending on how the land was classified, obtain a fee simple absolute title to the land. Specifically, homesteaders could enter agricultural lands and obtain fee simple absolute title to 160 acres without payment, *see e.g.* 3 Stat. 566 (1820), coal miners could enter coal lands and obtain fee simple absolute title to 160 acres upon payment of not less than either $10 or $20 per acre depending upon the distance of the land from the nearest railroad, 17 Stat. 607 (1873), and oil and gas explorers could enter mineral lands, locate and perfect gas placer claims, and obtain fee simple absolute title upon payment of $2.50 per acre. 30 U.S.C. § 29, 30, 37 (1988).

In practice however, the application of the various public land laws left much to be desired, in large part because the Department of the Interior did not investigate and classify lands before allowing entry. Rather, the Department relied on entrymen to classify their own parcels of land as chiefly valuable for agriculture, coal, or minerals. Consequently, patents to millions of acres of land were issued based largely on statements of entrymen as to the nonmineral character of the land. *See e.g. Watt v. Western Nuclear, Inc.*, 462 U.S. 36, 48, n.9 (1983); U.S. Geological Survey, *The Classification of the Public Lands*, pp. 12-13, 32-33 (1913).

The resulting misclassification of lands occurred mainly for two reasons. First, entrymen made good faith mistakes in classifying their lands because it was often difficult to determine whether the land was more valuable for the minerals it contained or for the more obvious agricultural purpose. *See Deffeback v. Hawke*, 115 U.S. 392, 405 (1885). *See also Watt v. Western Nuclear, Inc.*, 462

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U.S. at 48, n.9. Second, in recognition of cc as the nation's chief energy resource, the price an entryman had to pay to obtain title to coal lands substantially exceeded that for other types of lands. In addition, a greater amount of land was needed to support a coal mining operation than could be obtained lawfully under the Coal Lands Act of 1873. Thus, incentives existed for entrymen to cheat by misclassifying lands valuable for coal. As a result, patents were issued to millions of acres of western coal lands which had been misclassified as non-coal lands.

The tide of events during the first decade of the 20th century focused national attention on coal lands and precipitated great debate over management of the country's primary energy resource. First, coal was the chief energy resource fueling the nation's shift from an agrarian economy to an industrial economy. The coal supply had been plentiful but during this period, a coal shortage struck the west. *See* 40 Cong. Rec. 8448 (1906); *Coal Lands and Coal-Lands Laws of the United States*, 59th Cong., 1st Sess., 38 (Jan. 9, 1907); *Coal Lands and Coal-Lands Laws of the United States*, 59th Cong., 1st Sess., 27 (Jan. 14, 1907); *See* C. Mayer & G. Riley, *Public Domain, Private Domain—A History of Public Mineral Policy in America*, 114-130 (1985). Next, it became clear that coal lands were being obtained by fraud. *See e.g.*, 41 Cong. Rec. 450 (1906); *Coal Lands and Coal-Lands Laws of the United States*, 59th Cong., 1st Sess., 6 (Dec. 17, 1906) (1/2 to 2/3 of coal lands entered by unlawful means); *Mayer & Riley*, at 117 (although 6 million acres of coal lands were transferred into private ownership between 1873 and 1906, only an estimated 400,000 acres were sold under authority of Coal Lands Act of 1873). Finally, the railroad monopolies had fraudulently acquired vast amounts of coal lands and engaged in price-fixing to maintain their near "absolute control over all production and transportation and marketing of coal." *See e.g., Coal Lands and Coal-Lands Laws of the United*

States, 59th Cong., 1st Sess., 7 (Dec. 17, 1906); *Mayer & Riley*, at 119-123; *Report of Investigation by Interstate Commerce Commission into Railroad Discriminations and Monopolies in Coal*, S. Doc. No. 450, 60th Cong., 1st Sess., 2 (1908); Dec. 17, 1906 Hearing, pp. 1-18; H.R. Rep. 7643, 59th Cong., 2d Sess., 6 (1907).

Concerned about the impact of extensive land fraud on the need to develop and dispose of coal "under conditions which would inure to the benefit of the public as a whole," 41 Cong. Rec. 2615, 2806-08 (1907), President Theodore Roosevelt ordered the Department of Interior to withdraw from entry, lands that contained "workable coal" and to suspend issuance of patents on the lands withdrawn. 41 Cong. Rec. 2614-15 (1907). This order affected more than 65 million acres of land located in several western states including Colorado. *See e.g.* P. Gates, *History of Public Land Law Development*, 726 (1968); T. Larson, *History of Wyoming* 379 (1965). Approximately 1.47 million acres of the withdrawn lands were located near Durango, Colorado, *see Coal Lands and Coal-Lands Laws of the United States*, 59th Cong., 1st Sess., 15 (Dec. 18, 1906) including the acreage involved in this case.

President Roosevelt expressly stated that the reason for ordering the withdrawal included "the extremely unsatisfactory condition of the public land laws and . . . the prevalence of fraud . . . ." *See* 41 Cong. Rec. 450 (1906). He advised Congress that he had "temporarily withdrawn from settlement" lands containing workable coal until the "question . . . can be settled by legislation." *See Message of the President of the United States Communicated to the Two Houses of Congress at the Beginning of the Second Session of the 59th Congress*, p. 17 (Dec. 4, 1906).

Not surprisingly, President Roosevelt's action caused great distress to thousands of homesteaders who had entered upon and worked the land. *See* H.R. Rep. No.

2019, 60th Cong., 2d Sess., 1-3 (1909). To address homesteaders' valid concerns for their feared loss of time and labor in the land, and also to respond to the nation's need to protect and develop coal as an energy resource, Congress passed the Coal Lands Act of 1909 (the 1909 Act). This legislation reserved to the United States "all coal" contained in the withdrawn lands upon which entry had been made. It provided:

> Any person who has in good faith located, selected, or entered under the nonmineral land laws of the United States any lands which subsequently are classified, claimed, or reported as being valuable for coal, may, if he shall so elect, and *upon making satisfactory proof of compliance with the laws under which such lands are claimed, receive a patent therefor, which shall contain a reservation to the United States of all coal in said lands*, and the right to prospect for, mine, and remove the same. The coal deposits in such lands shall be subject to disposal by the United States in accordance with the provisions of the coal-land laws in force at the time of such disposal, but no person shall enter upon said lands to prospect for, or mine and remove coal therefrom without previous consent of the owner under such patent, except upon such conditions as to security for and payment of all damages to such owner caused thereby as may be determined by a court of competent jurisdiction. The owner under such patent shall have the right to mine coal for use on the land for domestic purposes prior to the disposal by the United States of the coal deposit. Nothing herein contained shall be held to affect or abridge the right of any locator, selector, or land located, selected, or entered by him. Such locator, selector, or entryman who has made or shall make final proof showing good faith and satisfactory compliance with the law under which his land is claimed shall be entitled to a patent without reservation unless at the time of

> such final proof and entry it shall be shown that the land is chiefly valuable for coal.

(Mar. 3, 1909, c. 270, 35 Stat. 844) (emphasis added).

Although the 1909 Act addressed the concerns of homesteaders already settled on lands subsequently withdrawn, western congressional leaders remained concerned about future settlement of their region given the vast tracts withdrawn as coal lands:

> [U]nless we have some legislation whereby entrymen, under reasonable restrictions, can be prevailed upon to settle upon and cultivate such of these lands as are adapted to agricultural purposes, very extensive areas will remain entirely undeveloped and unproductive except as they are utilized for grazing purposes.

See H.R. Rep. No. 377, p. 3. *See also* S. Rep. No. 703, p.2; *See also* 45 Cong. Rec. 6050 (1910).

In response, Congress enacted the 1910 Coal Lands Act (the 1910 Act) containing provisions substantially similar to the 1909 Act but addressing prospective entries on lands classified as valuable for coal:

> That upon satisfactory proof of full compliance with the provisions of the laws under which entry is made, and of [sections 833 to 85 of this title], *the entryman shall be entitled to a patent to the land entered by him, which patent shall contain a reservation to the United States of all the coal in the lands so patented*, together with the right to prospect for, mine, and remove the same. The coal deposits in such lands shall be subject to disposal by the United States in accordance with the provisions of the coal-land laws in force at the time of such disposal. Any person qualified to acquire coal deposits or the right to mine and remove the coal under the laws of the United States shall have the right, at all times, to enter upon the lands selected, entered, or patented,

as provided by sections 83 to 85 of this title, for the purpose of prospecting for coal thereon upon the approval by the Secretary of the Interior of a bond or undertaking to be filed with him as security for the payment of all damages to the crops and improvements on such lands by reason of such prospecting. Any person who has acquired from the United States the coal deposits in any such land, or the right to mine or remove the same, may reenter and occupy so much of the surface mining and removal of the coal therefrom, and mine and remove the coal, upon payment of the damages caused thereby to the owner thereof, or upon giving a good and sufficient bond or undertaking in an action instituted in any competent court to ascertain and fix said damages. The owner under such limited patent shall have the right to mine coal for use upon the land for domestic purposes at any time prior to the disposal by the United States of the coal deposits. Nothing herein contained shall be held to deny or abridge the right to present and have prompt consideration of applications to locate, enter, or select, under the land laws of the United States, lands which have been classified as coal lands with a view of disproving such classification and securing a patent without reservation.

(June 22, 1910, c. 318, § 3, 36 Stat. 584) (emphasis added).

Over the next several decades more than 16 million acres in the west, including 1.35 million acres in Colorado, were patented under the 1909 and 1910 Acts. *See* U.S. Bureau of Land Management, *Public Land Statistics —1991*, p. 16 (1992). The patented lands in Colorado included the surplus lands on the Southern Ute Reservation which had been opened to non-Indian homestead entry. During the ensuing years then, numerous homesteaders were issued patents subject only to the United States' coal reservation. The non-federal defendant class

in this case claim their respective rights, titles, and interests as successors in interest to these patentees.

In the mid 1930's, the United States initiated a marked shift in Indian policy from "allotment and assimilation" which deemphasized tribal existence by granting land allotments to individual Indians, *see* F. Cohen *Handbook of Federal Indian Law* Ch. 2, Sec. C, 127 (1982), to a "revival of tribalism." *See* F. Cohen *Handbook of Federal Indian Law* Ch. 2, Sec. D, 145 (1982). This new emphasis on tribal self-determination found statutory expression in the Indian Reorganization Act of 1934. 48 Stat. 984, Ch. 576 (June 18, 1934), codified at 25 U.S.C. §§ 461-479 (1988) (IRA). The IRA in pertinent part provided:

> The Secretary of the Interior, if he shall find it to be in the public interest, is hereby authorized to restore to tribal ownership the *remaining surplus lands* of any Indian reservation opened . . . [before June 18, 1934] . . .
>
> *Provided, however, That valid rights or claims of any persons to any lands so withdrawn existing on the date of the withdrawal shall not be affected by [sections 461-479 of this title]*: . . .

25 U.S.C. § 463 (emphasis added) (italics in original).

In 1938, under the authority of the IRA, the Department of the Interior conveyed to the Tribe equitable title in approximately 200,000 acres of coal which previously had been reserved to the United States in patents issued over the years to non-Indian entrymen under the 1909 and 1910 Acts. The Tribe's claim in this action is based on the premise that reservation of the coal by the United States in the 1909 and 1910 Acts includes reservation of CBM gas which was restored to the Tribe in 1938 along with the coal.

As a result of the amalgam of methods by which one could obtain ownership of the land, presently the Tribe's

reservation is a checkerboard of different types of ownership interests including tribal lands held in trust by the United States for the benefit of the Tribe, lands held by the Tribe in its own name, individual Indian land allotments subject to federal trust restrictions, land owned in fee simple by individual Indians, and lands held in fee simple by non-Indians. *Southern Ute Indian Tribe v. Board of County Comm'rs*, 855 F.Supp. 1194, 1196 (D.Colo. 1994). With this historical backdrop about which I discern no genuine material factual dispute, I turn to the central issue in the case.

III.

The Ownership Question

The central question in this case is whether Congress included CBM gas in its reservation to the United States of "coal" under the Coal Lands Acts of 1909 and 1910.[1] I hold that, as a matter of law, Congress' reservation of coal in the United States in the Acts of 1909 and 1910 did not include reservation of CBM gas. Consequently, title to CBM gas in the lands at issue here was conveyed by United States patents issued to homesteaders under the 1909 and 1910 Acts upon surplus lands on the Tribe's reservation. Accordingly, the Tribe acquired no title to the CBM gas when, in 1938, under authority of the IRA, the United States restored the coal to the Tribe.

A.

Plain meaning

The Tribe argues that the meaning of the word "coal" in the Acts of 1909 and 1910 is ambiguous because it

[1] Although I eschew footnotes, the Tribe's allusion to historic injustices wrought upon the indigenous peoples of America through European colonialization and by the concomitant concept of "manifest destiny," compels this note. My task is to discern the intent of Congress in 1909 and 1910. It is beyond my jurisdiction and the issues framed in this case to engage in an eschatological analysis of the wrongs perpetrated against American Indians.

might refer not only to rock but also to the gas contained in and around the rock. I disagree.

Statutory construction is a matter of law to be decided by the court. *United States v. Montoya*, 827 F.2d 143, 146 (7th Cir. 1987). The primary task in construing a statute is "to give effect to the will of Congress, and where its will has been expressed in reasonably plain terms, that language must ordinarily be regarded as conclusive." *Negonsott v. Samuels*, —— U.S. ——, 113 S.Ct. 1119, 1122-23 (1993). The controlling congressional intent is that which exists as of the date of enactment of the statute. *Watt v. Western Nuclear, Inc.*, 462 U.S. 36, 62 (1983). This rule has added significance here because the defendant class traces its ownership through chains of title beginning with U.S. patents issued under the 1909 and 1910 Acts. Thus, the relevant congressional intent is that which existed at the time of the passage of the Acts in 1909 and 1910.

In determining congressional intent, I look first to the language of the statute and assume that its plain meaning accurately expresses legislative purpose. *United States v. James*, 478 U.S. 597, 604 (1986); *Consumer Product Safety Comm'n v. G.T.E. Sylvania, Inc.*, 447 U.S. 102, 108 (1980); *United States v. Shriver*, 989 F.2d 898, 901 (7th Cir. 1992). The apparent natural meaning of a statute will be preferred to any hidden, curious "signification." *United States v. Colorado & N.W.R.R.*, 157 F. 321, 332 (8th Cir. 1907). I assume that the legislative purpose is expressed by the ordinary meaning of the words used. *Id.* Moreover, "if words of common use [are contained in a statute, they] are to be construed in their natural, plain and ordinary significance." *Balanced Rock Scenic Attractions v. Town of Manitou*, 38 F.2d 28, 30 (10th Cir. 1930). The plain meaning of a word is not determined by reference to variations on its ordinary meaning, but by the ordinary meaning itself, *i.e.*, the way it is *generally* used. *Copeland v. MBNA America.*,

N.A., 820 F. Supp 537, 540 (D.Colo. 1993). When Congress does not define a specific term, I may presume also that the drafters intended its ordinary meaning to attach to the word. *Russello v. United States*, 464 U.S. 16, 21 (1983). It then is appropriate to look to general dictionary and encyclopedia definitions to ascertain the plain meaning of the word. *See Addison v. Holly Hill Fruit Products*, 322 U.S. 607, 617-18 (1944); *United States v. Jackson*, 759 F.2d 342, 344 (4th Cir. 1985); *Torti v. United States*, 249 F.2d 623, 626 (7th Cir. 1957). And, statutes should be construed in a common sense fashion. *See First United Methodist Church of Hyattsville v. U.S. Gypsum Co.*, 882 F.2d 862, 869 (4th Cir. 1989).

The 1909 Act, codified at 30 U.S.C. § 81, provides that the patent "shall contain a reservation to the United States of *all coal in said lands* . . . ." (emphasis added). The parallel language in the 1910 Act, codified at 30 U.S.C. § 85, states that the "patent shall contain a reservation to the United States of *all the coal in the lands* so patented . . . ." (emphasis added)

The texts of the 1909 and 1910 Acts do not define the term "coal." General dictionaries and encyclopedias of the day, however, illustrate the common ordinary meaning of "coal." For example, the American Dictionary of the English Language 244 (1889) defined coal as "a black, or brownish black, *solid*, combustible substance consisting . . . mainly of carbon." (emphasis added). Indeed, this definition is consistent with the definition of coal throughout the decades. The Webster's New International Dictionary of the English Language published in 1920 defined coal as "a black, or brownish black, *solid*, combustible mineral substance . . . ." (emphasis added). *Id.* at 424. This definition of coal is not only virtually identical to the definition at the time of the passage of the Acts, but is also echoed by the current definition of

coal as "a black or brownish black *solid* combustible mineral substance . . . ." Webster's Third New International Dictionary 432 (1986) (emphasis added). I also note that current federal regulations define "coal" as ". . . combustible carbonaceous *rock*, classified as anthracite, bituminous, subbituminous, or lignite . . . ." 25 C.F.R. § 216.101 (1993) (coal on Indian lands) (emphasis added). *Butler v. USDA*, 826 F.2d 409, 413 n. 6 (5th Cir. 1987) (subsequent congressional statements, although worthy of less weight than contemporaneous ones, are entitled to careful consideration). The common meaning of "coal" has not changed in the last century.

Likewise, by way of comparison, at the time of the passage of the 1909 and 1910 statutes, "gas" was defined as "an aeriform fluid supposed to be permanently elastic . . . now applied to any substance when in the elastic or aeriform state." American Dictionary of the English Language 560 (1889). Three decades later, Webster's New International Dictionary of the English Language 892 (1920) defined "gas" as "an aeriform fluid, having neither independent shape nor volume, but tending to expand indefinitely." Today, "gas" is defined in the same way—"a fluid (as air) that has neither independent shape nor volume but tends to expand indefinitely; . . ." Webster's Third New International Dictionary 937 (1986). Even more to the point, an encyclopedia of the day underscores the fundamental difference between the two substances in its discussion of the commonly understood relationship between CBM gas and coal:

> Gases, consisting principally of light carburetted hydrogen or marsh gas, are often present in considerable quantity in coal in a dissolved or occluded state, and the evolution of these upon exposure to air, especially when a sudden diminution of atmospheric pressure takes place, constitutes one of the

> most formidable dangers that the coal miner has to encounter.

VI Encyclopaedia Britannica 575 (University Press 1910).

In a more technical vein, scientific dictionaries have defined "coal" as "[a] *solid, brittle,* more or less distinctly stratified, combustible carbonaceous *rock,* formed by partial to complete decomposition of vegetation . . . ." *A Dictionary of Mining, Mineral, and Related Terms* 222 (1968) (emphasis added), and "a *solid* . . . substance varying in color from dark-brown to black, *brittle,* combustible, and used as a fuel. A. Fay, *A Glossary of the Mining and Mineral Industry 163 (1920).* (emphasis added). Again, in a parallel but more technical view, "gas" is defined as:

> A state of matter in which cohesive forces are practically nonexistent and therefore the motion of the molecules is unrestrained. A gas has neither definite shape nor volume.

J. Henderson, *Metallurgical Dictionary* 151 (1953).

Common to all of the foregoing definitions is the description of "coal" in narrow, specific terms within which CBM gas does not fit. In contrast, "gas" is consistently defined in broad, general terms within which CBM gas clearly does fit.

My examination of these many varied sources leads to the inexorable conclusion that in 1909 and 1910, motivated by the burning need to protect and develop the nation's primary fuel resource, Congress intended to impart to the term "coal" its ordinary and common meaning as a solid rock fuel. Even without aid of reference to such definitional sources, common sense dictates that in 1909 and 1910, Congress intended "coal" to mean the solid rock substance. Hence, it is not surprising that Congress did not undertake definition of this simple term. It is also significant that the texts of the 1909 and 1910

Acts mention "coal" at least 20 times, but the term "gas" is not used once. Neither is the term "constituent" found in either Act. Under these circumstances, it would require not merely some, but herculean ingenuity to create ambiguity in the 1909 and 1910 Acts. *See Rothschild & Bro. v. United States,* 179 U.S. 463, 465 (1990). *Cf. TVA v. Hill,* 437 U.S. 153, 173 n. 18 (1978) (assertions of ambiguity do not transform a clear statute into an ambiguous provision).

Notwithstanding these persuasive considerations for regarding "coal" as the solid rock mined from the ground, the Tribe argues that I give effect to a technical and scientific view that CBM gas is an inherent constituent of the coal and, thus, intended by Congress to be included in its mineral reservation of coal to the United States. As I understand it, present day scientists who are experts in the field disagree whether CBM gas is part of coal. *See e.g.* Mavor, Matthew J., *Overview of Coal Gas Reservoir Structure, Fluid Dynamics, and Completion Technology (January 15, 1993)* (CBM gas is separate and distinct from coal itself) (Amoco Exhibit 114); Levine, Jeffrey R., *A Brief Review of The Origin, Composition, and Mode of Occurrence of Natural Gas in Coal Beds (August 9, 1989)* (although scientific evidence is conflicting, there is considerable scientific merit to argument that CBM is a constituent of coal) (Amoco Exhibit 117); *Affidavit of Harry M. Marsh, Ph.D.* (CBM gas is one substance that makes up coal) (Tribe's Exhibit 2-H).

For two reasons, this present divergence in scientific opinion creates neither a genuine issue of material fact nor an ambiguity in the Acts. First, I must derive congressional intent as of the date of enactment. *Watt,* 462 U.S. at 62 (1983). Second, the Acts dealt with a practical subject in a practical way, and Congress intended that the term "coal" should be applied in its ordinary

and popular sense. *See e.g. Burke v. Southern Pac. R.R.*, 234 U.S. 669, 678 (1914) (interpreting mineral lands statute to include petroleum as a mineral). Thus, I conclude that Congress did not intend to reserve CBM gas in the 1909 and 1910 Acts but only the solid rock coal.

B.

Secondary Analysis

When, as in this case, no ambiguity is found in the statute, judicial construction is ordinarily complete. *O'Connor v. U.S. Dept. of Energy*, 942 F.2d 771, 773 (10th Cir. 1991). Although I do not think it necessary to resort to secondary materials or other rules to glean congressional intent, assuming the term "coal" is ambiguous in the 1909 and 1910 Acts, resort to such aids leads to the same result here. Congress did not intend to reserve CBM gas but only the solid coal.

Although the starting point is the language of the statute itself, I may look to extrinsic aids including legislative history and the construction placed on the statute by the agency which administers it. *Amgen Inc. v. U.S. Int'l Trade Comm'n*, 902 F.2d 1532, 1538 (Fed. Cir. 1990). Clear evidence of legislative intent prevails over other principles of statutory construction. *Johns-Manville Corp. v. United States*, 855 F.2d 1556, 1559 (Fed. Cir. 1988). In interpreting language in a statute, a court may look to its object and policy. *Aulston v. United States*, 915 F.2d 584, 589 (10th Cir. 1990). Remarks of the sponsor of legislation as reported in the congressional record are an "authoritative guide" to its construction. *North Haven Bd. of Educ. v. Bell*, 456 U.S. 512, 526-27 (1982); *Nuclear Regulatory Comm'n v. Federal Labor Relations Authority*, 879 F.2d 1225, 1230 (4th Cir. 1989). Also, the circumstances under which the legislation was enacted are relevant to its construction. *Commissioner of Internal Revenue v. Engle*, 464

U.S. 206, 217 (1984); *FDIC v. Isham*, 777 F.Supp. 828, 831 (D.Colo. 1991). If Congress knows how to express itself and chooses not to, its silence is probative of intent. *See In re Providence Television Ltd. Partnership*, 75 B.R. 139, 140 (N.D.Ill. 1987).

1. *Legislative History*

Because my focus is on the intent of Congress at the time the statute was enacted, *Watt*, 462 U.S. at 62, I look to the legislative history of the Acts including, to the extent possible, what Congress then knew about the subject of its legislation. *FDIC v. Isham*, 777 F.Supp. at 831.

When the 1909 and 1910 Acts were passed, CBM gas was not known as a valuable mineral. To the contrary, it was common knowledge that CBM gas was a deadly hazard associated with coal mining. *See e.g.* J. Fassett, "Coalbed Methane—A Contumacious, Free-Spirited Bride; the Geologic Handmaiden of Coalbeds," *Energy Frontiers in the Rockies* 131 (1989). For example, caged canaries were kept in coal mines to serve as "early warning gas detectors." More dramatically, "firemen" exploded collected gas in the mine by wrapping themselves in fire-resistant blankets saturated with water. The "firemen" would then creep forward in the mine and cause an explosion by projecting a candle at the end of a long pole into an area where CBM gas had collected, then fling themselves on the ground while the flames passed overhead. Dexter S. Kimball, *Book of Popular Science* 412 The Grolier Society, Inc. 1952 (1924).

Transcripts of the extensive committee hearings and debates conducted on the proposed coal lands legislation illustrate congressional knowledge of the subject of coal. The House of Representatives Committee on the Public Lands on Coal Lands and Coal-Land Laws of the United States (Committee) was responsible for authoring the

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bills that became the 1909 and 1910 Acts. That committee had the benefit of several United States Geological Survey (USGS) reports addressing various aspects of the "coal issue." *See* e.g. George H. Ashley, *The Value of Coal Land, reprinted in, The Valuation of Public Coal Lands,* U.S.G.S. Bulletin 424, 3-47, H.R. Doc. No. 502, 61st Cong., 2d Sess. (1910); Marius R. Campbell, *Character and Use of the Yampa Coals, reprinted in, The Yampa Coal Field, Routt County, Colorado,* U.S.G.S. Bulletin 297, 82-96, H.R. Doc. No. 936, 59th Cong., 1st Sess. (1906); Marius R. Campbell, *Contributions to Economic Geology,* 1906, *Part II—Coal, Lignite, and Peat* U.S.G.S. Bulletin 316, 5-12, H.R. Doc. No. 823, 59th Cong., 2d Sess. (1906); Rollin T. Chamberlin, *Notes on Explosive Mine Gases and Dust,* U.S.G.S. Bulletin 383, 3-67, H.R. Doc. No. 1538, 60th Cong., 2d Sess. (1909); Rollin T. Chamberlin, *Papers on the Conservation of Mineral Resources,* U.S.G.S. Bulletin 394, 1-26, H.R. Doc. No. 1554, 60th Cong., 2d Sess. (1909); Arthur J. Collier, *The Coal Resources of the Yukon, Alaska,* U.S.G.S. Bulletin 218, 1-71, H.R. Doc No. 63, 58th Cong. 2d Sess. (1903); Arthur J. Collier, *Geology and Coal Resources of the Cape Lisburne Region, Alaska,* U.S.G.S. Bulletin 278, 1-54, H.R. Doc. No. 826, 59th Cong. 1st Sess. (1906); Robert H. Fernald, *The Present Status of the Producer-Gas Power Plant in the United States, reprinted in, Contributions to Economic Geology,* 1906, Part II— *Coal, Lignite, and Peat,* U.S.G.S. Bulletin 316, 439-459, H.R. Doc. No. 823, 59th Cong., 2d Sess. (1906); Cassius A. Fisher, *Depth and Minimum Thickness of Beds as Limiting Factors in Valuation, reprinted in, The Valuation of Public Coal Lands,* U.S.G.S. Bulletin 424, 48-75, H.R. Doc. No. 502, 61st Cong., 2d Sess. (1910); G.B. Richardson, *Natural Gas Near Salt Lake City, Utah, reprinted in, Contributions to Economic Geology,* 1904, U.S.G.S. Bulletin 260, 480-83, H.R. Doc. No. 401, 58th Cong., 3d Sess. (1905); Frank C. Schrader & Erasmus Haworth, *Oil and Gas of the Independence Quadrangle, Kansas, reprinted in, Contribution to Economic Geology,* 1904, U.S.G.S. Bulletin 260, 446-458, H.R. Doc. No. 401, 58th Cong., 3d Sess. (1905); Millar K. Shaler, *A Reconnaissance Survey of the Western Part of the Durango-Gallup Coal Field of Colorado and New Mexico, reprinted in, Contribution to Economic Geology,* 1906, *Part II—Coal, Lignite, and Peat,* U.S.G.S. Bulletin 316, 376-426, H.R. Doc. No. 823, 59th Cong., 2d Sess. (1906) and Joseph A. Taff, *The Durango Coal District, Colorado, reprinted in, Contribution to Economic Geology,* 1906, *Part II—Coal, Lignite, and Peat,* U.S.G.S. Bulletin 316, 321-337, H.R. Doc. No. 823, 59th Cong., 2d Sess. (1906). A pervasive theme in these reports is the focus on coal as the primary energy resource for the United States. Concern for supply and demand is evident in one report by Marius Campbell, U.S.G.S. Geologist in Charge of the coal project:

> The need for information [about coal] is imperative, for, although the amount of coal . . . seems so great as to be well-nigh inexhaustible, the consumption is increasing so rapidly that already the question of a future supply of fuel is a serious one and the Government is surely justified in using every means possible to conserve the supply for the use of future generations.

Marius R. Campbell, *Contributions to Economic Geology,* 1906, *Part II—Coal, Lignite, and Peat* U.S.G.S. Bulletin 316, 5-6, H.R. Doc. No. 823, 59th Cong., 2d Sess. (1906).

The Committee also had the benefit of Mr. Campbell's knowledge about coal when he testified in person before them. *See Hearings on Coal Lands and Coal-Land Laws of the United States Before the House Committee on Public Lands,* 59th Cong., 2d Sess. (1907). The Committee hearings transcripts show that Congress was aware of the

association of CBM gas with the coal and that possibly one day the CBM gas might have value. During his testimony, Campbell speculated, "[i]t may be that gas will finally be adopted generally [for the production of power] —either gas from oil or gas from coal." *Id.* at 19. Nevertheless, no one, including Campbell, opined in written reports or congressional testimony that CBM gas was a valuable energy resource which ought to be reserved to the United States in the Acts. *See e.g.* Marius R. Campbell, *Contributions to Economic Geology, 1906, Part II—Coal, Lignite, and Peat,* U.S.G.S. Bulletin 316, 1-6, H.R. Doc. No. 823, 59th Cong., 2d Sess. (1907) and Rollin T. Chamberlin, *Notes on Explosive Mine Gases and Dust,* U.S.G.S. Bulletin 383, 1-67, H.R. Doc. No. 1538, 60th Cong., 2d Sess. (1909). *See also Hearings on Coal Lands and Coal-Land Laws of the United States Before the House Committee on Public Lands,* 59th Cong., 2d Sess. (1907). Indeed, Campbell had written "[c]oal . . . is the fuel of the present, and, so far as can be see, will continue to lead . . . for a long time to come." Campbell, U.S.G.S. Bulletin 316 at 6. Also, in analyzing estimates of future coal production, both Campbell and his co-author Edward W. Parker, prognosticated that water power was the future source of energy which would prolong the life of the country's coal supply. Marius R. Campbell and Edward W. Parker, *Coal Fields of the United States,* U.S.G.S. Bulletin 394, 28-29 (1909).

I next look to comments of congressional representatives themselves as evidence of what Congress meant by its use of the word "coal." *Nuclear Regulatory Comm'n v. Federal Labor Relations Authority,* 879 F.2d at 1230. Their dialogue lends clarity and meaning to the Acts in contrast with the studied and intentional ambiguity injected in current legislation by members of Congress. *See e.g.* Civil Rights Act of 1991. On February 16, 1909, Congressman Mondell of Wyoming, Chairman of the Committee and sponsor of the 1909 and 1910 Acts addressed

the House of Representatives about the 1909 Act which, in his words, was written "for protection of the rights of surface entrymen." 45 Cong.Rec. 2502 (1909). Consistent with this concern, the scope of the 1909 Act was limited to providing relief for those homesteaders who had entered lands before the lands were withdrawn because they were deemed by the U.S.G.S. to be "chiefly valuable for coal." *See* 45 Cong. Rec. 6040-41 (1910); H.R. Rep. No. 377, 61st Cong., 2d Sess., 4 (1910).

In anticipation of putting the bill to a vote, Rep. Mondell spoke at length about "the purposes of this bill." 45 Cong.Rec. 2502-04 (1909). Never once did Mondell mention or refer to CBM gas or any other "constituent" of coal. *Id.* The following exchange occurred when the specific scope of the reservation was questioned:

> Mr. STEPHENS (Texas): I desire to know the difference between this law which the gentleman proposes and the law as it now exists. What change is proposed, and why?
>
> Mr. MONDELL (Wyoming): . . . It is the *first legislation before Congress providing for a limited patent,* or a patent reserving the mineral. . . .
>
> Mr. STEPHENS: Is it not a fact that valuable minerals are reserved now to the Government?
>
> MR. MONDELL: No; that is not true. The patent having issued, the patent carries everything in the land with it, and the Supreme Court has decided in a number of cases that if the law be complied with in good faith and the entryman makes payment and final proof, thereafter the Government is barred from raising the question as to any mineral that may occur in the land.
>
> Mr. STEPHENS: That applies also to oil and coal?
>
> Mr. MONDELL: It applies to all kinds of minerals. In other words, *the patents issued by the Gov-*

ernment of the United States heretofore have been patents in fee.

Mr. STEPHENS: Could the gentleman better arrive at what he desires by only patenting the surface of the land and *reserving all minerals, precious and otherwise?*

Mr. MONDELL: That has been discussed at some length, and *the Committee on Public Lands is not of the opinion that ought to be done.* We believe this is quite a sufficient departure from the past practice of the Government. The lands which this legislation will affect are lands which the department has claimed contain some *coals* of value.

Mr. STEPHENS: Is not this a step in that direction of issuing *limited* patents?

Mr. MONDELL: It is; and I trust it is as far as we will go in that direction.

45 Cong.Rec. 2504 (1909) (emphasis added).

Congress enacted the bill and on March 3, 1909 the President signed the 1909 Act into law.

The scope of the 1909 Act being limited to entries before withdrawal, concern remained as to those lands not yet entered upon for homesteading. Under the "chiefly valuable for coal" criterion, in Colorado alone "over 9,000,000 acres of land [were] withdrawn as coal lands." 45 Cong.Rec. 6050 (1910). As I noted earlier, representatives were particularly concerned that the withdrawals would retard expansion and settlement of the west. *See* H.R. Rep. No. 377, p. 3. *See also* S. Rep. No. 703, p. 2; 45 Cong. Rec 6050 (1910). As I noted earlier, Congressman Mondell introduced the 1910 Act, modeled after the 1909 Act. Once again, before it was enacted, the purpose and scope of the bill was debated by the House:

Mr. STEPHENS (Texas): Why is it necessary to preserve and reserve to the Government the *coal* and not at the same time reserve to the Government *other fuels such as gas and oil?*

45 Cong. Rec. 6044 (emphasis added).

. . .

Mr. MONDELL (Wyoming): . . . Oil and gas present much greater difficulties [than coal], when we propose to separate the surface from the mineral, ...

Id.

Congressional understanding of the nature of the coal is further exemplified in the following statements by Representative Ferris:

Mr. FERRIS (Oklahoma): . . . [T]his is an important matter; . . . it involves every *ton of coal* in the United States . . . .

Id. at 6046. (emphasis added).

After they have prospected and before they can *mine or remove one pound or one ton of coal* . . . .

Id. (emphasis added).

. . . we have the undoubted right to surround the reservation of coal with reasonable restraint, *so that the coal will not get away from us.*

Id. (emphasis added).

Now pause a moment and let me show what you have got to do in order to *remove the coal, the ultimate object to be obtained.*

Id. at 6048. (emphasis added).

These debates reflect Congress' clear intent in the 1909 and 1910 Acts to depart in the most narrow way possible from the historic practice of the United States to grant

fee simple absolute title to homesteaders. This narrow departure took the form of granting a patent with reservation of coal but not of oil, *gas*, or any other minerals. In addition, it is significant that coal was referred to by the "ton" as a solid to be "mined" from the land. Use of such terms lends additional support to my conclusion that Congress intended to reserve only the solid rock coal. Moreover, the overriding object of Congress was to insure an adequate source of the nation's primary energy resource. That was coal as commonly understood to be a solid rock.

The treatment of coal in public lands legislation before and after the 1909 and 1910 Acts is also indicative of Congressional intent underlying those Acts. *See Aulston*, at 589. Consistent with its role as the nation's primary energy resource, coal was treated separately from all other minerals in the legislative scheme of the 19th century. In 1864, Congress passed legislation aimed at promoting expansion and settlement of the west by authorizing entry on coal lands. 13 Stat. 343 (1864). Upon fulfilling certain conditions, including payment of not less than either $10 or $20 per acre depending on the distance of the land from a railroad, an entryman would receive a fee simple absolute patent. *See e.g.* 17 Stat. 607 (1873); 13 Stat. 529 (1865); 13 Stat. 343 (1864). Soon thereafter, Congress also enacted legislation addressing the method by which entrymen could obtain patents to lands valuable for all types of mineral deposits other than coal. 14 Stat. 251 (1866) (similar provision codified as 30 U.S.C. § 22). *See also* 17 Stat. 91 (1872) (codified as 30 U.S.C. § 26); 16 Stat. 217 (1870).

A chronological examination of public lands acts from 1864 to the present, highlights a conscious legislative intent to move methodically from issuance of fee simple absolute patents, to issuance of patents with a narrow mineral reservation, and finally to the issuance of patents

with the broadest reservation possible of valuable mineral rights in the government. In its initial departure from issuing unlimited patents, Congress passed the 1909 and 1910 Acts which reserved a single mineral—coal. The next legislative reservation of minerals occurred in the Act of 1914, 30 U.S.C. § 121. There, Congress broadened the scope of mineral reservation by enumerating specific minerals to be reserved—"phosphate, nitrate, potash, oil, *gas*, or asphaltic minerals." (emphasis added).

During congressional proceedings on the 1914 Act, Rep. Mondell, sponsor of the 1909 and 1910 Acts, spoke once more about the scope of mineral reservations in the United States:

> Mr. MANN: Under such circumstances, where the land has been withdrawn for [asphaltic minerals] and we give a surface title, why should not the government reserve *all* of the minerals under the surface?
>
> . . .
>
> Mr. MONDELL: Mr. Speaker, the gentleman's suggestion relates to a general mineral reservation. . . . The moment you *depart from the kind of reservation that we have heretofore provided for in the case of coal, and which we are now extending to these other minerals*—the moment you depart from that *theory of the reservation of those minerals only for which the land is withdrawn*—you must logically go to the extreme of withholding all minerals.
>
> Mr. MANN: Why not do that?
>
> Mr. MONDELL: That is a pretty large question, and it has been argued here several times . . . .
>
> . . .
>
> Mr. MONDELL: Mr. Speaker, the monarchical theory is to reserve all minerals to the crown, upon the theory that the mere subject is not entitled to anything except the soil that he stirs. It [reserva-

> tion of minerals to the government] is . . . a relic of monarchical government, of peonage, if you please . . . .
>
> Our fathers departed from that plan. I do not think we should dispose of lands in fee simple for agricultural purposes that do unquestionably or probably contain *valuable minerals,* and we are reserving in such lands the minerals which they are believed to contain . . . and it seems to me that is going quite far enough, and that it would not be wise to go further. *It is a rather radical departure from our past practice to [now] make a general reservation of all of the minerals. It should not be done. But if you are going to depart from the principle in this bill, which is the principle in the coal bill which passed a couple of years ago, there is no middle ground. It is either a reservation of . . . minerals which the lands are believed to contain or it is a reservation of all minerals. . . .*

51 Cong. Rec. 10493-94 (1914) (emphasis added).

Two years later, Congress enacted the Homestead Act of 1916, 43 U.S.C. § 299, which contained the broadest mineral reservation to date—"all the coal and other minerals."

What emerges from this abundant legislative history is a clear expression of congressional intent to move from its initial policy of no mineral reservation, to a progressive widening of the scope of its mineral reservation from the most narrow reservation to the broadest possible. Comparison of the terms of the 1864 Coal Lands Act, the 1909 and 1910 Acts, the 1914 Act, and the Homestead Act of 1916 demonstrates that Congress knew how to reserve specific minerals when it chose or to make a broad reservation of minerals when it chose. Hence, overwhelming legislative history leads to the inescapable conclusion that when the 1909 and 1910 Acts were passed,

Congress did not intend to include CBM gas in the reservation of the "coal" to the United States.

In the face of overwhelming legislative intent that Congress did not intend to reserve CBM gas in the 1909 and 1910 Acts, the Tribe relies on two well-established principles in advancing its claim that CBM gas is part of the reserved coal. First, nothing passes by implication in a public land grant and, second, such grants should be interpreted in favor of the government. *Andrus v. Charlestone Stone Products Co. Inc.,* 436 U.S. 604, 617 (1978). The Tribe overlooks, however, an equally well established exception to these rules. Public land grants "are not to be so construed as to defeat the intent of the legislature, or to withhold what is given either expressly or by necessary or fair implication. *Leo Sheep Co. v. United States,* 440 U.S. 668, 682-83 (1979), *quoting United States v. Denver & Rio Grand R.R.,* 150 U.S. 1, 14 (1893). In this case, the intent of Congress is clear, or at the very least, it is fair to imply, that the reservation of "coal" did not include CBM gas.

Next, the Tribe asserts the general rule applied in Indian matters that whenever doubt or ambiguity exists in federal Indian statutes or regulations, such doubt is resolved in favor of the tribes. *See, e.g., Oneida County, N.Y. v. Oneida Indian Nation of N.Y.,* 470 U.S. 226, 247 (1985); *Three Affiliated Tribes of the Fort Berthold Reservation v. Wold Engineering, P.C.,* 467 U.S. 138, 149 (1984); *Ramah Navajo School Bd., Inc. v. Bureau of Revenue of N.M.,* 458 U.S. 832, 838 (1982). However, the 1909 and 1910 Acts are not federal Indian laws. Rather, they are public land laws. While the Acts arguably may now affect Indian lands, the Acts were not passed for tribal benefit. Thus, this rule is inapposite in this case.

2. *1981 Solicitor's Opinion*

I also look to the effect of an opinion issued in 1981 by the Solicitor to the Secretary of the Interior addressing the issue of "who owns the coalbed gas in land where the coal or oil and gas was reserved to the U.S . . ." *Ownership Of And Right To Extract Coalbed Gas in Federal Coal Deposits,* 88 I.D. 538, 539 (1981). Although the Solicitor did not specifically address minerals on Tribal lands, the opinion concluded that "the reservation of coal to the United States in the Act of Mar. 3, 1909 and the Act of June 22, 1910, 30 U.S.C. §§ 81, 83-85 (1976), did not include the coalbed gas found in the reserved coal." *Ownership,* 88 I.D. at 540.

Chevron, U.S.A., Inc. v. Natural Resources Defense Council, Inc., 467 U.S. 837 (1984) controls the analysis for evaluating the weight to be given the Solicitor's decision:

> First, always, is the question whether Congress has directly spoken to the precise question at issue. If the intent of Congress is clear, that is the end of the matter; for the court, as well as the agency, must give effect to the unambiguously expressed intent of Congress. (fn. omitted).
>
> Rather, if the statute is silent or ambiguous with respect to the specific issue, the question for the court is whether the agency's answer is based on a permissible construction of the statute. (fn omitted).

Chevron, at 842-43. *See also Sullivan v. Everhart,* 494 U.S. 83, 88-89 (1990); *Exxon Corp. v. Lujan,* 970 F.2d 757, 759 (10th Cir. 1992). In determing whether the agency's construction of the statute is permissible, a reviewing court need not conclude that the agency's construction is the only one it could have adopted or even that the construction is the one the court would have reached if it were initially deciding the issue. *See e.g.*

Federal Election Comm'n v. Democratic Senatorial Campaign Comm., 454 U.S. 27, 39 (1981). Rather, the agency's decision is given controlling weight unless it is "arbitrary, capricious, or manifestly contrary to the statute." *Chevron,* at 844. The Acts of 1909 and 1910 neither mention CBM gas nor contain a definition of "coal." Thus, under the *Chevron* analysis I turn to whether the Solicitor's opinion is based on a permissible construction of these statutes.

In a well-reasoned opinion, the Solicitor thoroughly and meticulously considered the historical context surrounding the passage of the 1909 and 1910 Acts, the legislative history of the Acts, and measured the treatment of "coal" on the one hand and "gas" on the other in subsequent federal legislation and regulations. The Solicitor concluded that CBM gas was not part of the coal estate reserved to the United States. *Ownership,* at 540, 549. I independently reach the same conclusion. It follows then that in my view the Solicitor's conclusion that Congress' use of the term "coal" did not include CBM gas is not "arbitrary, capricious or manifestly contrary to the statute." *Chevron,* 467 U.S. at 843.

To summarize, I conclude Congress intended to give the term "coal" in the 1909 and 1910 Acts its common ordinary meaning. Congress intended "coal" to mean the solid black rock mineral contained in the ground and not CBM gas. Assuming *arguendo* the term "coal" renders the Acts ambiguous, I conclude that at the time of their passage, there was no intent on the part of Congress to include CBM gas in its reservation of coal to the United States in the Acts. Furthermore, and in any event, I grant deference to the 1981 Solicitor's opinion that Congress' use of the term coal does not include CBM gas. In short, all modes of legislative analysis of congressional intent point but one way. CBM gas was not reserved to the United States in the Coal Lands Acts of 1909 and

1910. CBM gas, therefore, was conveyed by patents issued to the lands in question and, thus, was not restored to the Tribe in 1938 under the IRA.

IV.

Common Defenses

As stated at the outset, in addition to the central issue of ownership I also certified the defendant class to address application to the ownership question of certain defenses said to be common to the defendant class. This question has also been exhaustively briefed and argued including application of the Nonintercourse Act, 25 U.S.C. § 174 and allocation of Rule 56 burdens under 25 U.S.C. § 194. Having held for the class on the question of ownership, however, I need not address further the application of the common defenses to the ownership question or the application of the Nonintercourse Act.

V.

Federal Defendants

Also before the court is the federal defendants' motion to dismiss or alternatively, for summary judgment addressed to the Tribe's "Eleventh Claim for Relief":

> 74. The Federal Defendants have breached their fiduciary duties to the Tribe by permitting or acquiescing in the extraction of substances from the coalbeds or strata, or the extraction of constituent, inherent and integral components of the Tribe's Reserved and Restored Coal and the Subject Lands without the consent of the Tribe and in violation of various federal laws including, but not limited to, 25 U.S.C. § 177, 25 U.S.C. § 396a, 25 U.S.C. § 2101 U.S. et seq., and 25 U.S.C. § 476.

Plaintiff's First Amended Complaint.

The sole premise argued by the federal defendants in support of their motion for summary judgment is that a claim based on breach of a trust duty to manage the Tribe's CBM gas resource must fail because the Tribe does not own the CBM gas. I agree. Based on my ruling that, as a matter of law, the Tribe does not own the CBM gas, it follows *a priori* that the federal defendants have no fiduciary duty to the Tribe to manage the CBM gas for the benefit of the Tribe. Therefore, I will grant the federal defendants' motion for summary judgment on the issue of breach of fiduciary duty to manage the CBM gas as a tribal resource.

In support of their motion to dismiss, the federal defendants argue that the Tribe's claim for relief against the United States for breach of fiduciary duty is barred by the statute of limitations contained in 28 U.S.C. § 2401(a). In turn, the nonfederal defendants argue that if this action is dismissed against the federal defendants it must also be dismissed against them because the federal defendants are indispensable under Fed.R.Civ.P. 19. Based on my ruling on the ownership issue, however, I do not reach either issue.

The Tribe's Eleventh Claim against the federal defendants is broader than the issue of breach of fiduciary duty based on CBM gas addressed in this opinion and order. For example, it may encompass some duty to ensure mitigation of damage to the coalbed strata caused by CBM gas extraction. Because the federal defendants' motion for summary judgment addressed only its duty stemming from the Tribe's ownership claim, other issues concerning these defendants remain for a later day.

Accordingly, it is ORDERED that

1. Amoco's, motion for summary judgment is GRANTED on the question of ownership of CBM gas and judgment shall enter in favor of the defendant class against the plaintiff Tribe upon its claim for declaration of ownership of CBM gas in the lands at issue;

2. Amoco's motion for summary judgment on the class action defenses is DENIED as moot based on the conclusion that the Tribe does not own the CBM gas;

3. the Tribe's motion for summary judgment is DENIED;

4. federal defendants' motion for summary judgment is GRANTED but only on the issue of breach of fiduciary duty for failure to manage the CBM gas;

5. a further scheduling and status hearing will be held on November 4, 1994 at 3:00 p.m. at which time I will consider Fed.R.Civ.P. 54(b) certification. Ten days in advance of the hearing, the parties shall submit an agreed proposed form of Rule 54(b) order together with proposed form of judgment to be certified. Any areas of disagreement in the proposed forms are to be specified along with reason therefor, and supplemented by suggested alternative language.

Date: February 1, 1995 *nunc pro tunc* to September 13, 1994.

BY THE COURT

/s/ Lewis T. Babcock
LEWIS T. BABCOCK,
Judge

APPENDIX D

STATUTORY PROVISIONS

(United States Code, Title 30)

§ 81. Rights of entrymen of lands subsequently classified as coal lands; disposal of coal deposits

Any person who has in good faith located, selected, or entered under the nonmineral land laws of the United States any lands which subsequently are classified, claimed, or reported as being valuable for coal, may, if he shall so elect, and upon making satisfactory proof of compliance with the laws under which such lands are claimed, receive a patent therefor, which shall contain a reservation to the United States of all coal in said lands, and the right to prospect for, mine, and remove the same. The coal deposits in such lands shall be subject to disposal by the United States in accordance with the provisions of the coal-land laws in force at the time of such disposal, but no person shall enter upon said lands to prospect for, or mine and remove coal therefrom, without previous consent of the owner under such patent, except upon such conditions as to security for and payment of all damages to such owner caused thereby as may be determined by a court of competent jurisdiction. The owner under such patent shall have the right to mine coal for use on the land for domestic purposes prior to the disposal by the United States of the coal deposit. Nothing herein contained shall be held to affect or abridge the right of any locator, selector, or entryman to a hearing for the purpose of determining the character of the land located, selected, or entered by him. Such locator, selector, or entryman who has made or shall make final proof showing good faith and satisfactory compliance with the law under which his land is claimed shall be entitled to a patent without reservation unless at the time of such final proof and entry it shall be shown that the land is chiefly valuable for coal.

§ 83. Homestead or desert-land and other entries

Unreserved public lands of the United States exclusive of Alaska which have been withdrawn or classified as coal lands, or are valuable for coal, shall be subject to appropriate entry under the homestead laws by actual settlers only, the desert-land law, to selection under section 641 of Title 43, and to withdrawal under the Act approved June seventeenth, nineteen hundred and two, known as the Reclamation Act, whenever such entry, selection, or withdrawal shall be made with a view of obtaining or passing title, with a reservation to the United States of the coal in such lands and of the right to prospect for, mine, and remove the same. But all homestead entries made hereunder shall be subject to the conditions, as to residence and cultivation, of entries under section 218 of Title 43. Those who have initiated non-mineral entries, selections, or locations in good faith, prior to June 22, 1910, on lands withdrawn or classified as coal lands may perfect the same under the provisions of the laws under which said entries were made, but shall receive the limited patent provided for in sections 83 to 85 of this title.

§ 84. Applications for entry

Any person desiring to make entry under the homestead laws or the desert-land law, any State desiring to make selection under section four of the Act of August eighteenth, eighteen hundred and ninety-four, known as the Carey Act [43 U.S.C.A. § 641], and the Secretary of the Interior in withdrawing under the Reclamation Act lands classified as coal lands, or valuable for coal, with a view of securing or passing title to the same in accordance with the provisions of said Acts, shall state in the application for entry, selection, or notice of withdrawal that the same is made in accordance with and subject to the provisions and reservations of sections 83 to 85 of this title.

§ 85. Patents for lands, with reservation of coal; disposal of coal deposits

Upon satisfactory proof of full compliance with the provisions of the laws under which entry is made, and of sections 83 to 85 of this title, the entryman shall be entitled to a patent to the land entered by him, which patent shall contain a reservation to the United States of all the coal in the lands so patented, together with the right to prospect for, mine, and remove the same. The coal deposits in such lands shall be subject to disposal by the United States in accordance with the provisions of the coal-land laws in force at the time of such disposal. Any person qualified to acquire coal deposits or the right to mine and remove the coal under the laws of the United States shall have the right, at all times, to enter upon the lands selected, entered, or patented, as provided by sections 83 to 85 of this title, for the purpose of prospecting for coal thereon upon the approval by the Secretary of the Interior of a bond or undertaking to be filed with him as security for the payment of all damages to the crops and improvements on such lands by reason of such prospecting. Any person who has acquired from the United States the coal deposits in any such land, or the right to mine or remove the same, may reenter and occupy so much of the surface thereof as may be required for all purposes reasonably incident to the mining and removal of the coal therefrom, and mine and remove the coal, upon payment of the damages caused thereby to the owner thereof, or upon giving a good and sufficient bond or undertaking in an action instituted in any competent court to ascertain and fix said damages. The owner under such limited patent shall have the right to mine coal for use upon the land for domestic purposes at any time prior to the disposal by the United States of the coal deposits. Nothing herein contained shall be held to deny or abridge the right to present and have prompt consid-

eration of applications to locate, enter, or select, under the land laws of the United States, lands which have been classified as coal lands with a view of disproving such classification and securing a patent without reservation.

APPENDIX E

CLASSIFICATION AND VALUATION OF COAL LANDS.

REGULATIONS.

DEPARTMENT OF THE INTERIOR,
Washington, D.C.,
April 10, 1909.

1. For the purposes of classification and valuation, coal deposits shall be divided into four classes:

(A) Anthracite, semianthracite, coking, and blacksmithing coals;

(B) High-grade bituminous noncoking coals having a fuel value of not less than 12,000 B. T. U. on an unweathered, air-dried sample;

(C) Bituminous coals having a fuel value of less than 12,000 B. T. U. on an unweathered, air-dried sample, and high-grade subbituminous coals having a fuel value of more than 9,500 B. T. U. on an unweathered, air-dried sample;

(D) Low-grade subbituminous coals having a fuel value below 9,500 B. T. U. on an unweathered, air-dried sample, and all lignite coals.

CLASSIFICATION OF COAL LANDS.

2. Lands underlain by coal beds, none of which contain 14 inches or over of coal, exclusive of partings, of class A, B, or C, or over 36 inches of class D, shall be classed as noncoal land.

3. Lands containing coals of classes A and B of any thickness at depths greater than 3,000 feet, shall be classified as noncoal lands, except where the rocks are practically horizontal and the coal lies within two miles of the outcrop or point at which it can be reached by a 3,000-foot shaft.

4. Lands containing coals of class C of any thickness at a depth greater than 2,000 feet shall be classed as noncoal land, except where the rocks are practically horizontal and the coal lies within two miles of the outcrop or point at which it can be reached by a 2,000-foot shaft.

5. Lands containing coals of class D of any thickness at a depth greater than 500 feet shall be classed as noncoal land, except where the rocks are practically horizontal and the coals lies within one mile of the outcrop or point at which it can be reached by a 500-foot shaft.

VALUATION OF COAL LANDS.

6. The price of coal lands of classes A, B, and C shall be determined on the basis of estimated tonnage at the rate of one-half to 1 cent per estimated ton for class C; 1 to 2 cents per estimated ton for class B; and 2 to 3 cents per estimated ton for class A, when the lands are within fifteen miles of a completed railroad, and half that much when at a greater distance, but the price shall in no case exceed $300, except in districts which contain large coal mines where the character and extent of the coal are well known to the purchaser. When, however, topographic conditions affect the accessibility of the coal, the land within the 15-mile limit may be given a lower valuation, but in no case shall it be placed at less than the minimum.

7. The rates per ton in the preceding paragraph are based on the assumption that only one bed of coal is present. If more than one bed occurs in any tract of land in such relationship that the mining of one will not necessarily disturb the other, then for the second bed there shall be added to the price of the first bed 60 per cent of the value of the second bed according to the schedule; 40 per cent of the value of the third, and 30 per cent of the value of each additional bed, but the estimated price for coal shall in no case exceed $300, except in districts which contain large coal mines where the character and

extent of the coal deposits are well known to the purchaser.

8. The tonnage shall be estimated for the purpose of valuation on the basis of 1,000 tons recovery per acre-foot.

9. The coal price of lands of class D shall be the minimum provided by law, $20 per acre when within fifteen miles of a railroad and $10 per acre when at a greater distance.

10. In all valuations of coal lands any special conditions enhancing the value of the land for coal-mining purposes shall be taken into consideration.

11. When only a part of a smallest legal subdivision is underlain by coal, the price per acre shall be fixed by dividing the total estimated coal values by the number of acres in the subdivision, but in no case shall this be less than the minimum provided by law.

12. When lands which were at time of classification more than fifteen miles from a railroad are brought within the 15-mile limit by the beginning of operation of a new road, all values given in the original classification shall be doubled by the register and receiver.

13. Except in case of entries now pending, or entries made prior to classification, review of classification or valuation may be had only upon application therefor to the Secretary, accompanied by a showing clearly and specifically setting forth conditions not existing or known at time of examination.

Approved:

R. A. BALLINGER,
Secretary.

APPENDIX F

DECISION OF THE DEPARTMENT OF THE INTERIOR

OWNERSHIP OF AND RIGHT TO EXTRACT COALBED GAS IN FEDERAL COAL DEPOSITS

M-36935

May 12, 1981

Act of March 3, 1909—Act of June 22, 1910—Patents of Public Lands: Reservations

Patents issued pursuant to the Act of Mar. 3, 1909, or the Act of June 22, 1910, 30 U.S.C. §§ 81, 83-85 (1976) reserved to the United States "all coal" and the right to prospect for, mine and remove the "coal deposits" underlying the patented lands. Congress in the 1909 and 1910 Acts intended to, and did, reserve only the coal and not other minerals found in association with coal. Accordingly, all minerals other than coal, including coalbed gas, passed to the surface owner at the time a patent was issued pursuant to the 1909 or 1910 Acts.

Act of July 17, 1914—Patents of Public Lands: Reservations

Should coalbed gas occur in lands in which "oil and gas" were reserved to the United States in agricultural patents issued under the Act of July 17, 1914, 30 U.S.C. § 121 (1976), that coalbed gas is reserved to the United States.

Mineral Leasing Act: Methods of Development—Oil and Gas Leases: Generally

The MLA refers only to "gas" or "natural gas" without any qualifying adjectives, thus supporting a nonrestrictive reading of those terms to include coalbed gas. Coalbed gas is leasable under the oil and gas leasing provision of the MLA, 30 U.S.C. § 226 (1976).

Coal Leases and Permits: Leases—Mineral Leasing Act: Methods of Development

Coalbed gas is not included in a coal lease under the MLA. In the coal leasing provision of the MLA, Congress did not provide for a coal lessee's extraction of minerals related to or associated with coal. 30 U.S.C. § 201 (Supp. II 1978). This provision does not authorize a coal lessee's extraction of coalbed gas, other than the venting of the gas required by mine health and safety laws and regulations.

TO: SECRETARY

FROM: SOLICITOR

SUBJECT: OWNERSHIP OF AND RIGHT TO EXTRACT COALBED GAS IN FEDERAL COAL DEPOSITS

Federal coal deposits may contain large quantities of recoverable coalbed gas. Due to its flammability and to the danger it poses to underground mining, this gas,[1] often referred to as methane,[2] has long been feared by the

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[1] Coalbed gas is a byproduct of coalification, the process through which plant material buried in sediments is successively transformed from peat into lignite, subbituminous coal, bituminous coal and finally anthracite. E. Craig and M. Myers, *Ownership of Methane Gas in Coalbeds*, 24 Rocky Mtn. Mineral Law Institute 767-68 (1978) (hereinafter cited as "Craig and Myers").

[2] Methane (CH_4), a colorless, odorless, flammable gas, is the primary component of coalbed gas. A. Kim, *Estimating Methane Content of Bituminous Coalbeds from Adsorption Data*, U.S. Department of the Interior, Bureau of Mines, Report of Investigations (USBM RI) 8245 L (1977). "During the biogenic stage of coal

coal mining industry.[3]

Although traditionally coal mining practices have wasted the gas by venting it into the atmosphere, there is curently a great deal of interest in developing coalbed gas as an energy source in its own right.[4]

Deep coalbeds in the Appalachian region are the most likely source of commercially marketable gas, but preliminary studies show that deep coalbeds in the West may also contain recoverable gas.[5] A number of studies, including research by the Department of Energy, have concluded that recovery of coalbed gas is commercially and technically feasible.[6] However, the unresolved legal status of coalbed gas on federal lands and in federal coal has hindered any decision on how, and under what right of extraction, it can be developed. In order to expedite development of this energy source, the Department must resolve two issues: (1) who owns the coalbed gas in land where the coal or oil and gas was reserved to the United States; and (2) whether the coal or the oil and gas leasing provisions of the Mineral Lands Leasing Act of 1920, *as amended*, 30 U.S.C. § 181 *et seq.* (1976) (Mineral

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formation, methane is the predominant gas produced. * * * During the diagenetic stage of coalification, methane and other hydrocarbons are produced." A. Kim, *Experimental Studies on the Origin and Accumulation of Coalbed Gas*, USBM RI 8317, at 16 (1978).

[3] *See* U.S. Bureau of Mines Information Circular No. 7900 (1963); M. Irani, C. Timmons, T. Bobbick, M. Deul and M. Zabetakis, *Methane Emission from United States Coal Mines, A Survey*, Bureau of Mines Information Circular No. 8558 (1972); M. Zabetakis, M. Deul and M. Skow, *Methane Control in United States Mines, Bureau of Mines*, Circular No. 8600 (1973).

[4] *See* Office of the White House Press Secretary, "Fact Sheet on the President's Import Reduction Program II" (July 16, 1979).

[5] P. McGinley, *Legal Problems Relating to Ownership of Gas Found in Coal Deposits*, 80 W. Va. L. Rev. 369, 372-73 (1978) (hereinafter referred to as "McGinley").

[6] *See* McGinley, *supra* note 5, at 375-77.

Leasing Act of MLA) apply to the leasing of coalbed gas for commercial development.

For the reasons set forth below, I conclude that: (1) the reservation of coal to the United States in the Act of Mar. 3, 1909 and the Act of June 22, 1910, 30 U.S.C. §§ 81, 83-85 (1976), did not include the coalbed gas found in the reserved coal; (2) the reservation of oil and gas to the United States in the Act of July 17, 1914, 30 U.S.C. §§ 121-123 (1976) included coalbed gas found in the lands patented subject to such a reservation; and (3) coalbed gas is disposable under sec. 17 of the Mineral Leasing Act, 30 U.S.C. § 226 (1976), the oil and gas leasing provision.

I. *Ownership of Coalbed Gas*

Coalbed methane is both scientifically defined[7] and legally regarded[8] as a gas.[9] The relationship of coalbed

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[7] A. Kim, *Estimating Methane Content of Bituminous Coalbeds*, *supra* note 2.

[8] Several courts, addressing the question of what constitutes "gas" or "natural gas," have defined those terms to comprehend coalbed methane. *See, e.g., McCoy* v. *United Gas Public Service Co.*, 57 F. Supp. 444, 445 (W.D. La. 1932) (gas "consists of invisible vapors which are produced from the earth, containing varying amounts of hydrocarbon"). *See also Northern Natural Gas Co.* v. *Grounds*, 441 F.2d 704, 715 (10th Cir. 1971), *aff'g* 292 F. Supp. 619 D. Kan. 1968), where the court held that a grant of "oil and gas" included not only the hydrocarbon gases (such as methane) but also the helium extracted with them. The court approved the trial court's definition of gas as "any naturally-formed aeriform substance indigenous in the underlying reservoir * * *." 441 F.2d at 711, *citing* 292 F. Supp. at 686.

[9] By contrast coal is defined as: "[a] solid brittle, more or less distinctly stratified, combustible carbonaceous rock, formed by partial to complete decomposition of vegetation; not fusible without decomposition and very insoluble. The boundary line between peat and coal is hazy * * * as is the boundary line between coal and graphite and the boundary line between carbonaceous rock and coal." U.S. Bureau of Mines, *A Dictionary of Mining Mineral and Related Terms* 222 (1968).

methane to coal is described in a Bureau of Mines Report:

> Methane is always present in coal * * *. It occurs admixed with other hydrocarbons, CO2 N2 O2, H2 and He. It is a normal byproduct of the coal-forming process. Although much of the gas formed during coalification migrates away from the coal, a significant portion is retained in the coal and adjacent rocks. Some free gas is present in cracks and fractures, but most is adsorbed on the internal surface of micropores within the coal. The amount of gas that the coal contains depends primarily upon pressure, temperature, adsorptive capacity, and moisture content of the coal.[10]

Thus, although coalbed gas exists in coal deposits,[11] the two resources are distinct, and are potentially severable. In order to determine the ownership of coalbed gas in federal mineral deposits, it is necessary first to examine the various statutes in which rights to mineral deposits have been reserved to the Federal Government.

A. *Coal Land Withdrawals and Coal Reservations*

Beginning in 1906, President Roosevelt withdrew over 75 million acres of western land containing known "workable coal" from all forms of entry (i.e. homestead, agriculture). The purpose of these withdrawals was to prevent the continued loss, by the United States, of lands valuable for coal. However, by February of 1909, there were 11,688 original homestead and desert land entries

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10 A. Kim, *Estimating Methane Content of Bituminous Coalbeds*, *supra* note 2.

11 *See* Deul, *Methane Drainage from Coal Beds, A Program of Applied Research*, 60 Rocky Mtn. Coal Mining Inst. 13 (1964), describing coal as a "porous * * * solid with two distinct pore systems * * * [in which] gas can exist as free gas in cracks and fractures (macropores) or be adsorbed on the internal surface of the micropores."

of record in lands which had been withdrawn as valuable for coal, and the issuance of final certificates on 2,771 homestead and desert land entries had been suspended pending classification of the lands for coal. H.R. Rep. No. 2019, 60th Cong., 2d Sess. 2, 5-7 (Feb. 2, 1909).

Congress, spurred by the desire to re-open these lands to entry, passed the Act of Mar. 3, 1909, 30 U.S.C. § 81 (1976), and the Act of June 22, 1910, 30 U.S.C. §§ 83-85 (1976). The Act of 1909 provided relief for entrymen who in good faith had occupied lands for agricultural purposes and then, before patent, suffered withdrawal of that land from entry on the basis that it was coal land. The 1909 Act allowed the entryman to perfect his entry, but he received a patent reserving to the United States "all coal * * * and the right to prospect for, mine, and remove the * * * coal deposits." 30 U.S.C. § 81 (1976).

The 1910 Act provided alternate relief by opening withdrawn coal lands to agricultural entry subject to a reservation to the United States of "all the coal in the lands so patented, together with the right to prospect for, mine, and remove the * * * coal deposits." 30 U.S.C. § 85 (1976).[12]

It is a well-established principle that nothing passes in a public land grant by implication and that such grants should be interpreted in favor of the government. *Andrus* v. *Charlestone Stone Porducts Co.*, 436 U.S. 604, 617 (1978). However, public land grants "'are not to be so construed as to defeat the intent of the legislature, or to withhold what is given either expressly or by necessary or fair implication * * *.'" *Leo Sheep Co.* v. *United States*,

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12 By the Act of Apr. 23, 1912, 30 U.S.C. § 77 (1976), Congress allowed entry under the homestead laws on unreserved public lands in Alabama containing coal deposits, subject to the provisions of the 1910 Act, 30 U.S.C. §§ 83-85 (1976). The 1912 Act incorporates sec. 3 of the 1910 Act by reference. *See* 1 American Law of Mining §§ 2.17 and 3.24B (1960).

440 U.S. 668, 682-83 (1979), *quoting United States* v. *Denver & Rio Grande R. Co.*, 150 U.S. 1, 14 (1893). When coal was reserved by the United States under the 1909 and 1910 Acts, coalbed gas was viewed not as a valuable resource, but as a nuisance, and an acknowledgement of its hazardous qualities is found in the legislative history of the Act of June 22, 1910. 45 Cong. Rec. Appendix 156 (Speech of Rep. John K. Tenner (May 10, 1910)). Although there was no affirmative Congressional policy enunciated toward the disposition or ownership of coalbed gas, it is apparent from the legislative history of both the 1909 and 1910 Acts that Congress was aware of the narrow scope of the proposed reservation of "coal." Explaining the effect of H.R. 24834,[13] Honorable F. W. Mondell, Chairman of the House Committee on Public Lands, engaged in the following colloquy:

> Mr. STEPHENS of Texas. Is it not a fact that valuable minerals are reserved now to the Government?
>
> Mr. MONDELL. No; that is not true. The patent having issued, the patent carries everything in the land with it. * * *
>
> Mr. STEPHENS of Texas. That applies also to oil and coal?
>
> Mr. MONDELL. It applies to all kinds of minerals. In other words, the patents issued by the Government of the United States heretofore have been patents in fee.
>
> Mr. STEPHENS of Texas. *Could the gentleman better arrive at what he desires by only patenting the surface of the land and reserving all minerals, precious and otherwise?*

[13] H.R. 24834, with amendments not relevant to this discussion, was enacted as the Act of Mar. 3, 1909, 30 U.S.C. § 81 (1976).

> Mr. MONDELL. That has been discussed at some length, and the Committee on Public Lands is not of the opinion that that ought to be done. *We believe this is quite a sufficient departure from the past practice of the Government. The lands which this legislation will affect are lands which the department has claimed contain some coals of value.*
>
> Mr. STEPHENS of Texas. Is not this a step in that direction of issuing limited patents?
>
> Mr. MONDELL. It is; and I trust it is as far as we will go in that direction.

43 Cong. Rec. 2504 (1909) (italics added).

Similarly, during debate on the 1910 legislation, Representative Mondell emphasized that the proposed legislation reserved to the Federal Government only the coal, and not other minerals, such as gas and oil.[14]

See 45 Cong. Rec. 6044 (1910). The statutory language and the legislative history belie the argument that Congress intended to reserve any mineral other than coal in the 1909 and 1910 Acts.

The conclusion that Congress in the 1909 and 1910 Acts reserved only coal, and not other minerals found in association with coal, is supported by the Act of Aug. 11, 1955, 30 U.S.C. § 541 (1976). This Act, known as the Uraniferous Legnite Act, authorized the location of mining claims and the removal of uranium-bearing lignite from the public lands classified as coal lands, and from entered, granted, or patented lands in which the coal deposits were reserved to the United States.[15]

[14] Secretary of the Interior Ballinger, commenting on the proposed 1910 legislation, observed that it "relate[s] only to lands which have been classified as, or are known to be, valuable for coal. In my judgment it would be well to extend its provisions to lands containing oil and natural gas." H. R. Rep. No. 377, 61st Cong., 2nd Sess. 4 (1910).

[15] The Multiple Mineral Development Act of 1954, 30 U.S.C. § 521 *et seq.* (1976), opened public lands known to be valuable for leasable

The intent of the law was to permit development of newly-discovered uranium-bearing lignite seams in federally-owned coal deposits, including coal reserved under the 1909 and 1910 Acts.[16] The uranium contained in the coal was a locatable mineral under the mining laws, and the locator of a uranium claim had "an absolute right to mine and remove [it]." H.R. Rep. No. 1478, 84th Cong., 1st Sess. 4 (1955). However, it was impossible to remove the uranium without removing the federally-owned lignite. Congress acknowledged that the entryman of land in which coal deposits were reserved to the United States has "*fee simple title to all other minerals in the land*, including valuable source materials [uranium], *regardless of the host material or the mode of occurrence*." *Id.* at 5. (italics added). Accordingly, sec. 4 of the Act provides the entryman of such lands with the right to "mine, remove, and dispose of lignite containing [uranium] and lignite necessary to be stripped or mined in the recovery of [the uranium] * * *." 30 U.S.C. § 541c (1976).

To Congress in 1955, then, the title of an entryman under the 1909 and 1910 Acts to all minerals in his land other than federally reserved lignite was not in dispute. The Uraniferous Lignite Act was both a recognition of this ownership, and a partial solution[17] to the problems

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minerals (*e.g.* coal) to location and patent of mining claims for locatable minerals (*e.g.* uranium). However, the 1954 Act did not provide for the location and extraction of a locatable mineral (uranium) occurring within a deposit of a Leasing Act Mineral (coal).

[16] *See* 101 Cong. Rec. 12300, 84th Cong., 1st Sess. (1955).

[17] Congress chose not to resolve such conflicts between surface entrymen and their grantees or lessees and federal coal lessees:

"Secs. 4 and 5 of the bill take cognizance of conflicting interests between the *entryman or owner [of entered, granted, or patented lands] who has title to any valuable source material contained in lignite* occurring in his lands and the lessee who has acquired the right to mine and dispose of such lignite through a lease agreement

of extracting and disposing of uranium occurring in direct association with federal lignite.

Our conclusion is further supported by the background to and enactment of the Act of Mar. 4, 1933, 30 U.S.C. § 124 (1976), in which Congress confronted the related problem of commingled deposits of potash and sodium. The Act of July 17, 1914, 30 U.S.C. § 121-123 (1976) (discussed further in part IB *infra*), authorized agricultural entries on lands withdrawn for potash, reserving to the United States the potash deposits. However, in New Mexico, valuable deposits of potash occurred in association with valuable sodium, a leasable mineral under the Mineral Leasing Act. Despite the Mineral Leasing Act's authorization of leases for sodium "and other related products," 30 U.S.C. § 262 (1976), and for potash "and other related products," 30 U.S.C. § 282 (1976), the Department took the position that the reserved potash in New Mexico and the sodium associated with it were not disposable under a single lease. Where patents had been issued under the 1914 Act reserving the potash, the surface owner had title to the sodium, "thus creating a *dual ownership of the same deposit* made up of both potash and sodium." H.R. Rep. No. 1938, 72nd Cong., 2d Sess. 2 (1933) (views of the Department of the Interior) (italics added). In response to this situation, Congress provide for agricultural entry on lands withdrawn or classified as valuable for sodium and/or sulphur, thereby consolidating in the United States for all future entries the mineral ownership for such commingled leasable deposits, 30 U.S.C. § 124 (1976).

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with the United States which reserved the coal in such lands at the time the lands were entered, granted, or patented.

"The committee feels that such conflict of interests should be resolved by the parties concerned or, failing that, by the local courts and not through legislation." H.R. Rep. No. 1478, 84th Cong., 1st Sess. 5 (1955). (italics added.)

A recent trial court decision,[18] based on common law principles, concluded that coalbed gas was not conveyed in a grant of "coal," and that the seller retained control over the gas, except for the right of the coal owner to vent it in the course of mining. The court cautioned, however, that the coalbed gas could not be extracted in any manner which would violate or diminish the property value of the coal. While the case is not controlling on the issue of ownership of coalbed gas in coal deposits reserved to the Federal Government in a federal land grant, the discussion of common law principles applicable to those private transactions lends further support to the conclusion that coalbed gas was not reserved with federal coal in nonmineral patents issued subject to the 1909 and 1910 Acts.

B. Reservation of Oil and Gas

Aside from coal lands, Congress continued the general policy of unity of surface and mineral estates in the disposition of public lands until 1914. By the Act of July 17, 1914, 30 U.S.C. §§ 121-123 (1976), Congress permitted nonmineral entry of lands withdrawn or classified as valuable for certain minerals including phosphate, nitrate, potash, oil and gas, reserving to the United States any and all of those minerals for which the lands were withdrawn or classified as valuable. As it had done in the 1910 Act for coal, Congress provided that patents issued under the 1914 Act "*contain a reservation to the United States of the deposits on account of which the lands so patented were withdrawn or classified or reported as valuable, together with the right to prospect for, mine, and remove the same.*" (italics added.) 30 U.S.C. § 121 (1976).

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[18] *United States Steel Corp.* v. *Hoge*, No. 78-682 (Pa. Ct. C. P., Greene County, Mar. 24, 1980), *appeal filed*, Oct. 22, 1980.

As it had done in the 1909 and 1910 statutes, Congress reserved *only* the minerals identified in the 1914 Act, allowing all other minerals in the affected lands to pass with the surface. Again, the legislative history is instructive of Congress' view of the scope of the reservation:

> Mr. MANN. [*w*]*hy should not the Government serve all of the minerals under the surface?* * * *
>
> Mr. MONDELL. [*t*]*he gentleman's suggestion relates to a general mineral reservation. Of course that is not what this bill provides.* * * * The moment you depart from *the kind of reservation that we have heretofore provided for in the case of coal, and which we are now extending to these other minerals* * * * you must logically go to the extreme of withholding all minerals. * * * Of course it is barely possible that *some other minerals might some time be found* than those for which the land is withdrawn, but it is not at all likely, and if in the far distant future some minerals should be found in the possession of farmers and others, I do not believe any public interest would be injured thereby.

51 Cong. Rec. 10493-94, 63rd Cong., 2nd Sess. (1914) (italics added). Thus, Rep. Mondell, the Chairman of the House Committee on Public Lands, expressly acknowledged that the 1914 Act's mineral reservations, like the prior coal reservations, were specific, and were limited to the named minerals.

If any coal rights passed into private ownership under an agricultural entry subject to the 1914 Act with a reservation to the United States of "gas," then the gas and the right "to prospect for, mine and remove the same," including coalbed gas, is reserved to the United States where the lands were withdrawn or classified as oil and gas lands, or were reported as valuable for oil and gas deposits. *Cf. Brennan* v. *Udall*, 251 F. Supp. 12, 25 (D. Colo. 1996),

aff'd, 379 F.2d 803 (10th Cir.), *cert. denied*, 389 U.S. 975 (1967) ("oil" reservation in the 1914 Act is generic and includes oil shale).

Like "oil," "gas" is a term of art, and the courts have interpreted gas broadly to include both fuel and non-fuel gases. *See* cases cited at note 8, *supra*. Therefore, should coalbed gas occur in the lands in which "oil and gas" were reserved to the United States under the 1914 Act, that coalbed gas would be retained under the Act.

II. Coalbed Gas is Leasable Under the Gas Leasing Provisions of the Mineral Leasing Act.

A. *Coalbed Gas is a "Gas" within the Meaning of the MLA and Applicable Regulations*

Sec. 1 of the MLA, *as amended*, 30 U.S.C. § 181 (1976), provides that:

> Deposits of coal, phosphate, sodium, potassium, oil, oil shale, native asphalt, solid and semisolid bitumen, and bituminous rock * * * or gas, and lands containing such deposits owned by the United States * * * shall be subject to disposition in the form and manner provided by this chapter * * *.

The MLA neither distinguishes coalbed gas nor provides any difinition of "gas" or "natural gas."[19] Thus, there is a definitional question raised by the MLA relating to the treatment of coalbed gas, similar to the question raised in the statutory reservations of 1909, 1910, and 1914.[20] The Mineral Leasing Act refers only to "gas" or

[19] Since the MLA uses "gas" in conjunction with "oil" and other fuels, the doctrine of *ejusdem generis* could arguably lead to a reading of the term restricted to hydrocarbon gas suitable for fuel. Since methane, the major component of coalbed gas, is a hydrocarbon gas suitable for fuel, even this restrictive interpretation would include coalbed gas.

[20] Based on a broad definition of "gas," and on the general intent of Congress to retain named mineral resources, this office has

"natural gas" without any qualifying adjectives, thus supporting a nonrestrictive reading of both terms.[21]

The legislative history of the MLA sheds little light on this subject. However, the regulations implementing the oil and gas leasing provisions of the MLA refer, and have uniformly over the life of the MLA referred to gas in general terms, leaving little doubt that coalbed gas is included in the meaning of the term "gas." Even where certain differences appear between coalbed gas and other mixtures or forms of hydrocarbon gas, the regulations, like the statute, do not distinguish them.

In Part 221 of the oil and gas operating regulations, gas is defined as "[a]ny fluid, either combustible or noncombustible, which is produced in a natural state from the earth and which maintains a gaseous or rarified state

expressed the opinion that carbon dioxide gas is included in the reservation of oil and gas in a land patent under the Act of July 17, 1914, 30 U.S.C. § 121 (1976). "Reservation of Carbon Dioxide Gas in Land Patent," Memorandum to the Colorado State Director, BLM, from the Regional Solicitor, Denver (July 12, 1979).

[21] The only apparent restrictive definition of gas appears in the Geothermal Steam Act of 1970, 30 U.S.C. § 1001 *et seq.* (1976). Sec. 27 of the Geothermal Steam Act, 30 U.S.C. § 1025 (1976) provides that in the leasing of geothermal resources, "[t]he United States reserves the ownership of and the right to extract * * * oil, *hydrocarbon gas*, and helium from all geothermal steam and associated geothermal resources produced from lands leased under this chapter in accordance with presently applicable laws * * *." (Italics added.)

Even if a limited definition of gas was intended, coalbed gas would still qualify as a reserverd gas under the Geothermal Steam Act. Since steam is commonly referred to as a gas, Congress probably limited the definition in this statute only to avoid confusion about which substances found in association with geothermal resources are properly extracted and exploited under a geothermal resource lease. In any event, this usage does not alter the use of the term "gas" in the Mineral Leasing Act, in the instant context.

at ordinary temperature and pressure conditions."[22] 30 C.F.R. § 221.2(o).

While the regulations acknowledge that gas comes from various fields and deposits at varying pressures, they do not distinguish between types of gases based on pressure or formations. Coalbed gas often comes from the wellhead at pressures below those of gas found in oil-bearing formations, but variances in pressure make no difference in the legal and regulatory treatment of the disposition of the gas. 30 CFR 221.44 provides that:

> *Gas of all kinds* * * * is subject to royalty, and all gas shall be measured by meter * * *. For computing the volume of all gas produced * * * the standard of pressure shall be ten ounces above an atmospheric pressure of 14.4 pounds * * *. All measurements of gas shall be adjusted by computation to these standards regardless of the pressure * * * at which the gas was actually measured. (italics added.)

Under this regulation, therefore, the volume of gas sold or produced is determined by a standard which disregards differences in wellhead pressure.

The only type of gas specifically mentioned in the MLA—helium—is also the only wellhead constituent of gas that Congress has deemed separable and reserved for specific governmental purposes.[23] Even helium, a nonhydrocarbon, is within the meaning of "gas" as used in the MLA, or else it would not have been necessary ex-

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22 This definition is unchanged since its adoption in 1942, 7 Fed. Reg. 4133 (1942). As noted at note 20, *supra*, this office has read this definition to encompass carbon dioxide gas.

23 Sec. 1 of the MLA, 30 U.S.C. § 181 (1976), provides: "[t]he United States reserves the ownership of and the right to extract helium from all gas produced from lands leased or otherwise granted under the provisions of this chapter."

pressly to exclude the right to extract helium under federal oil and gas leases.[24]

The meaning of gas in the MLA, therefore, has the same scope as that established for oil in *Brennan* v. *Udall, supra* and for gas under private lease in *Northern Natural Gas Co.* v. *Grounds, supra*—gas is to be defined broadly.

B. *Coalbed Gas is not Included in a Coal Lease under the MLA*

The Mineral Leasing Act provides distinct leasing requirements for coal and for gas. Gas deposits are leasable under sec. 17 of the MLA, 30 U.S.C. § 226 (1976), while coal leasing is covered in sec. 2, *as amended*, 30 U.S.C. § 201 (Supp. II 1978). Departmental regulations likewise contain distinct provisions for leasing and mining the two resources. Coal is governed by regulations at 43 CFR Part 3400 and CFR Part 211, while gas is covered by regulations at 43 CFR Part 3100 and 30 CFR Part 221.

From a resource recovery standpoint, coalbed gas is extractable during or in advance of the mining of underground coal by techniques very similar to those for recovering other commercial gases. Currently, coalbed gas may be drained from coalbeds in either of two ways, both involving vertical wells connected to horizontal holes or cracks in the coal that encourage passage of the gas to

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24 The Department has interpreted the helium reservation consistently with this conclusion. Sec. 1 of the current federal oil and gas lease form, Form 3110-2 (1977), gives the oil and gas lessee the "exclusive right and privilege to drill for, mine, extract, remove, and dispose of all the oil and gas deposits, except helium gas, in the lands leased. * * *" The form thus includes all types of gas—even nonhydrocarbon gases such as helium—within the meaning of "gas deposits." Except for the language excluding helium, this section of the lease form has remained essentially unchanged since its adoption in 1920. 47 L.D. 437, 447 (1920).

the well.[25] Because it is recoverable by gas recovery methods, coalbed gas is easily regulable as a gas.

Moreover, the coal leasing provisions of the MLA do not appear to provide for recovery of anything other than coal.[26] Nothing in existing coal leases or in the current coal lease form authorizes commercial extraction of coalbed gas or provides for the assessment of a royalty for its recovery. The fact that the Mineral Leasing Act includes rights to related minerals in the grant of rights under certain specific leases (other than coal) indicates an intention *not* to lease related minerals along with coal. The sodium, phosphate, and oil shale leasing sections of the MLA allow or require a lessee to extract certain minerals related to, or co-existing with, the principal leased mineral. The sodium leasing provisions in secs. 23 and 24 of the MLA, 30 U.S.C. §§ 261-262 (1976), authorize the Secretary to lease "chlorides, [etc.] of sodium," and require him to collect royalties on "sodium compounds and other related products." Similarly, 30 U.S.C. §§ 281-82 (1976) authorize the leasing of potassium, and require royalty collection on "potassium compounds and other related products." Sec. 9 of the MLA, 30 U.S.C.

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[25] According to one study, a single coalbed well can drain between 20 and 30 acres. M. Deul, A. Kim, *Coal Beds: A Source of Natural Gas*, The Oil and Gas Journal 49 (June 16, 1979). However, one method of extraction, hydraulic stimulation, reportedly has the potential of creating a safety hazard to coal mining by causing harm to the coal seam and the roof strata overlying the coal. *See United States Steel Corp.* v. *Hoge, supra*, slip op. at 7-12.

[26] Sec. 2 of the MLA, 30 U.S.C. § 201 (Supp. II 1978), authorizes leases granting the right to extract coal, and in 1920 required royalty payments on a per ton basis. Such a lease scheme was clearly not designed by Congress to encompass beneficial extraction of coalbed gas. Sec. 8A, 30 U.S.C. § 208-1(a), authorizes government exploration for "coal resources" recoverable by deep or surface mining methods. Other references to "deposits of coal" and "coal-field[s]" indicate that the statute's coal provisions do not contemplate gas extraction. 30 U.S.C. §§ 201(a), 208-1 (Supp. II 1978).

§ 211 (1976), authorizes the Secretary to lease and collect royalty on phosphate deposits "including associated and related minerals." The oil shale leasing provisions in sec. 21(a) of the MLA, 30 U.S.C. § 241(a) (1976), provide that "deposits" of oil shale are subject to lease, and that royalties are required "[f]or the privilege of mining, extracting, and disposing of oil *or other minerals* covered by a lease under this section. * * *" (italics added).

Congress inclusion of associated and related mineral products in these sections of the MLA stands in clear contrast to the absence of such language in the coal leasing provisions.[27] Indeed, the present coal leasing system appears only to grant the federal coal lessee the right to vent the gas for safety purposes.[28] Federal Coal Mine Health and Safety Act of 1977, 30 U.S.C. §§ 863, 877(h) (Supp. II 1978). *Cf. United States Steel Corp.* v. *Hoge, supra.* Analysis of the Mineral Leasing Act's provisions for leasing coal and oil and gas shows that a lease for "coal" does not include the right to extract gas, including methane,[29] and that coalbed gas is subject to disposition

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[27] As discussed in part IA, *supra*, even though the leasing provisions for both potash and sodium authorized leasing "other related products," 30 U.S.C. §§ 262, 282 (1976), when those two minerals had not been *reserved* together, the Department took the position that potash and associated sodium were not disposable under a single lease for potash. It is clear, then, that the coal leasing provision of the MLA, 30 U.S.C. § 201 (Supp. II 1978), which does not encompass "related" or "associated" minerals, does not authorize extraction of coalbed gas under a coal lease.

[28] The coal miner's expulsion of coalbed gas from mine tunnels is an exercise of an obligation distinct from the right of capture or ownership. The obligation to remove methane through ventilation or drainage is a safety precaution without which coal would not be mineable. See *Op. Att'y Gen.* No. 53, at 3-4 (Pa. 1974).

[29] While courts have held in cases involving private leases that a lease of "coal and other minerals" may include the right to extract oil and gas deposits, where only coal is granted (*i.e.*, not "coal and other minerals") the courts do not strain definitions to include other minerals. *E.g. Chartiers Block Coal Co.* v. *Mellon*, 152 Pa. 286, 25

as a gas under Sec. 17 of the MLA, 30 U.S.C. § 226 (1976).

Several companies holding federal oil and gas leases have inquired whether coalbed gas is covered by their leases, and have filed applications to drill for coalbed gas. Since existing oil and gas leases do not specifically reserve coalbed gas from the granting clause, it must be considered as leased. *See, e.g.*, Noncompetitive Oil and Gas Lease Form 3110-1 (March 1977). Sec. 2(d) of this form authorizes the Secretary to set minimum values for royalty computation purposes "on *any or all* oil, *gas*, natural gasoline, and other products obtained from gas," (italics added) and sec. 2(j) requires the lessee "[t]o exercise reasonable diligence in drilling and producing, * * * having due regard for the prevention of waste of oil or gas. * * * "

It must be noted that an oil and gas lessee does not have a license to develop the coalbed gas resource in any manner. The lease and Departmental regulations prohibit damage to coal or other mineral deposits. *See* Noncompetitive Oil and Gas Lease Form 3110-1, § 2j; Coal Lease Form 3130-1, § 3(e); and 30 CFR § 221.9. Should the lessee propose any drilling which would in the judgment of the Geological Survey cause damage to the coal deposit or create a safety hazard for subsequent coal mining, the application to drill may be denied. If there is an outstanding coal lease, the Department's authority to grant the gas drilling permit is restricted by the rights previously granted to the coal lessee. *Cf. United States Steel Corp.* v. *Hoge, supra*, (surface owner with gas reservation may not infringe upon coal owner's estate to recover

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A. 597 (1893). The court discussed the extent of the coal lease, concluding that "the grantee of the coal owns the coal but nothing else, save the right of access to it and the right to take it away." *Id.* at 296, 25 A. at 598-99. *See also, Op. Att'y Gen.* No. 53, *supra*, note 28, concluding that a coal lease does not convey the coalbed gas in the deposit.

coalbed gas beyond normal oil and gas recovery techniques).

III. *Conclusion*

Since Congress has never specifically addressed the question of whether the right to extract coalbed gas is part of a coal lease or part of an oil and gas lease, the question of coalbed gas ownership must be resolved by construction of the statutes which provide for the reservation of resources to the United States, and which authorize the leasing of those resources. This analysis leads to the conclusions: (1) that a reservation of "coal" does not include coalbed gas; and (2) that a reservation of "gas" encompasses coalbed gas. Furthermore, in our opinion, coalbed gas is disposable as a gas under sec. 17 of the Mineral Leasing Act, 30 U.S.C. § 226 (1976). However, nothing in this opinion warrants title to any oil and gas deposit nor detracts from any coal lessee's obligation to comply with the coalbed gas ventilation provisions of the Mine Health and Safety laws.

We are prepared to render any further advice you may deem appropriate regarding legal issues raised by the potential conflict between an oil and gas lessee and a coal lessee or by the possibility that coalbed gas development could harm or preclude subsequent recovery of the coal.

WILLIAM H. COLDIRON
Solicitor

APPENDIX G

DECISION OF THE DEPARTMENT OF THE INTERIOR

RIGHTS TO COALBED METHANE UNDER AN OIL & GAS LEASE FOR LANDS IN THE JICARILLA APACHE RESERVATION*

M-36970 *October 16, 1990*

Indians: Mineral Resources: Oil and Gas: Generally

Under Bureau of Indian Affairs Lease Form 5-157 (1947), paragraphs 1 and 10, the term "natural gas" unambigously includes coalbed methane.

Under Bureau of Indian Affairs Lease Form 5-157 (1947), paragraphs 1 and 10, the word "deposit" does not exclude methane found in coal from oil and gas deposits.

Indians: Reservations: Generally

Where the general intent to lease all gases is clear, the absence of specific intent to include coalbed methane as a gas in Bureau of Indian Affairs Lease Form 5-157 (1947), cannot create a reservation of that gas.

Indians: Mineral Resources: Oil and Gas: Generally

Before approving drilling permits for wells on the lease, the Department, pursuant to the Federal Government's trust responsibility to protect tribal resources, needs to satisfy itself that the proposed activities will be carried out with due regard for possible future coal mining operations.

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* Not in chronological order.

To: Secretary

From: Solicitor

Subject: Rights to Coalbed Methane Under an Oil and Gas Lease for Lands in the Jicarilla Apache Reservation

The Area Director of the Albuquerque Area Office, Bureau of Indian Affairs (BIA), has requested this Office's opinion on whether an oil and gas lease, between the Jicarilla Apache Tribal Council and Mobil Producing Texas & New Mexico Inc. (Mobil), authorizes Mobil to produce natural gas from coal seams deposited in the Fruitland Formation in New Mexico. Such gas is often referred to as "coalbed methane." Having reviewed the terms of the lease, we find that the lease unambiguously granted Mobil the right to produce any coalbed methane found within the lease.

BACKGROUND AND ISSUES

The March 7, 1902, lease between the Jicarilla Apache tribe and the Magnolia Petroleum Co. (predecessor to Mobil) employs the November 1947 version of the BIA's lease Form 5-157.[1] Like most oil and gas leases, the

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[1] The land subject to the lease is within the reservation set aside for the Jicarilla Apache Tribe. The reservation was established in 1887 by Executive Order. 1 C. Kappler, *Indian Affairs, Laws and Treaties* 875 (1904).

Oil and gas leasing on executive order reservations was first authorized by the Indian Oil Act of 1927, 25 U.S.C. § 398a. *Cotton Petroleum Corp. v. New Mexico*, 109 S.Ct. 1698, 1709-10 (1989). The 1927 Act permitted the leasing of unallotted lands within an executive order reservation "for oil and gas mining purposes in accordance with the provisions contained in section 398 of this title." 25 U.S.C. § 398a. Sec. 398, enacted in 1924, permitted the Secretary to lease certain unallotted land on reservations "for oil and gas mining purposes for a period of not to exceed ten years, and as much longer as oil or gas shall be found in paying quantities * * *" provided the Secretary had the "consent of the council speaking for such Indians."

These statutes were needed to authorize oil and gas leasing of these lands after Attorney General (and later Chief Justice) Stone

basic economics of this lease are that the Jicarillas received a bonus and receive royalties on production; the lessee received the rights to explore for and produce the oil and gas. More specifically, the Jicarillas received a bonus of $54,330 and "a royalty of 12½ percent of the value or amount of all oil, *gas*, and/or natural gasoline, and/or all other hydrocarbon substances produced and

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determined that Interior could not lease minerals on executive order reservations under the Mineral Leasing Act of 1920. 34 Op. Atty. Gen. 171 (1924), *rejecting E. M. Harrison*, 49 L.D. 139 (1922). *See* S. Rep. No. 985, 75th Cong., 1st Sess. 1 (1937).

The Indian Oil Act was revised by the Indian Mineral Leasing Act of 1938, 25 U.S.C. §§ 396a-396g, the authority under which the lease in question was issued. The 1938 Act authorizes the Secretary to approve the issuance of leases "for mining purposes * * * for terms not to exceed ten years and as long thereafter as minerals are produced in paying quantities." 25 U.S.C. § 396a. More specifically, it requires that "leases for oil- and/or gas-mining purposes" are to be offered to the highest responsible bidder, at public auction or on sealed bids, "upon such terms and subject to such conditions as the Secretary of the Interior may prescribe." 25 U.S.C. § 396b. Sec. 7 of the Indian Mineral Leasing Act of 1938 repealed "all Acts or Parts of Acts inconsistent herewith * * *" 52 Stat. 347 (1938).

It is beyond question that the Secretary had the authority to approve under the 1938 Act a lease which granted rights to coalbed methane as a part of the rights to oil and gas. Under "[t]he Indian Mineral Leasing Act of 1938, * * * [t]he Secretary is delegated the authority to define the terms of the leases and to 'make such rules and regulations as may be necessary for the purpose of carrying the provisions of [the] section into full force and effect * * *" *Shoshone Indian Tribe v. Hodel*, 903 F.2d 784, 787 (10th Cir. 1990).

In granting the Secretary and the Tribes broad discretion to fashion the terms of the leases, Congress followed the pattern it established when it enacted the first law authorizing mineral leasing on Indian lands, the Act of February 28, 1891. 25 U.S.C. § 397. That law authorized the leasing of "lands * * * occupied by Indians who have bought and paid for the same, * * * for a period not to exceed * * * ten years for mining purposes in such quantities and *upon such terms and conditions as the agent in charge of such reservation may recommend*, subject to the approval of the Secretary of the Interior." (Italics added). *See Cotton Petroleum Corp., supra* at 1709.

saved from the land leased herein." Lease Form 5-157 ¶ 3(c) (italics added). The lessee received the "exclusive right * * * to drill for, mine, extract, remove and dispose of all the oil and natural *gas* deposits" in Tract 178; that right was granted for "10 years from and after the approval hereof by the Secretary of the Interior and as much longer thereafter as oil and/or *gas* is produced in paying quantities from said land." Lease Form 5-157 ¶ 1 (italics added). Lease Form 5-157 specifically defines what the word "gas" was intended to mean: paragraph 10 provides that "[i]t is covenanted and agreed that helium gas, carbon dioxide gas, and *all other natural gases* are included under the term 'gas' as used in this lease * * *." (Italics added).

Broadly speaking, our inquiry here is whether this lease may be reasonably construed to *exclude* from the grant of rights to Mobil the right to produce natural gas found in coalbeds within its lease. For if that interpretation is reasonable, and if it better promotes the Tribe's interests than another interpretation would, then we are obliged to adopt it. *Jicarilla Apache Tribe v. Supron Energy Corp.*, 728 F.2d 1555, 1567 (10th Cir. 1984) (Seymour, J., dissenting in part), *adopted as majority opinion en banc*, 782 F.2d 855 (1986), *supplemented en banc*, 793 F.2d 1171 (1986), *cert. denied* 479 U.S. 970 (1986). However, for our obligation under *Jicarilla* to arise, there must be an ambiguity sufficient to permit more than one reasonable interpretation; for "the canon of construction regarding the resolution of ambiguities [in favor of a tribe] * * * does not permit reliance on ambiguities that do not exist * * *," *South Carolina v. Catawba Indian Tribe*, 476 U.S. 498, 506 (1986), and the Department is not "compelled to go contrary to and beyond the regulations and the leases" in fulfilling its obligation to the tribe. *Pawnee v. United States*, 830 F.2d 187, 191 (Fed. Cir. 1987), *cert. denied* 486 U.S. 1032 (1988).

In Solicitor's Opinion, M-36935, 88 I.D. 538 (1981), this Office concluded (among other things) that coalbed methane was a gas leasable under the provisions of the Mineral Leasing Act governing "oil and gas deposits." 30 U.S.C. § 226(a). Here we will consider three similar questions. First is whether coalbed methane is a "natural gas" within the meaning of ¶ 10 of the lease. We conclude that it is. Second is whether by agreeing that Mobil would receive rights to "oil and gas *deposits*," as opposed to "oil and gas," the parties intended to exclude natural gas found in coalbeds. We conclude the parties did not so intend. Third is whether the lease would be rendered ambiguous if it could be shown that the parties did not specifically intend to grant rights to coalbed methane. We conclude it would not.

ANALYSIS

I. Coalbed Methane is a "Natural Gas" Found in "Oil and Gas Deposits" within the Meaning of the Lease

Paragraph 10 expressly includes within the meaning of "gas" "all other natural gases." Long before 1952 the Department and the minerals industries understood coalbed methane to be a gas. *See, e.g.*, N. H. Darton, *Ocurrence of Explosive Gases in Coal Mines* 12-16, 225-26 (1915) (Bureau of Mines Bulletin No. 72). As explained in Opinion M-36935, "Coalbed methane is both scientifically defined and legally regarded as a gas * * * [A]lthough coalbed gas exists in coal deposits, the two resources are distinct, and are potentially severable." 88 I.D. at 540 (footnotes omitted). The only case addressing this point since Opinion M-36935 was issued has reached the same conclusion. *See United States Steel Corp. v. Hoge*, 468 A.2d 1380, 1382 (Pa. 1983) ("coal and coalbed gas are * * * separate physical entities"; coalbed gas contains same elements as other natural gas). We have found no definition of "natural gas" which would exclude coalbed methane. Paragraph 10 therefore includes coalbed methane as a "gas" covered by the lease.[2]

Nor is our analysis altered by the physical state methane may be in while in the coalbed. Technical analysis of coal in the San Juan Basin indicates that some coalbed methane exists in the "gaseous phase" just as methane exists in a sandstone or other reservior. But much of it is either adsorbed on or absorbed in the molecules of coal, and may be more accurately regarded as a condensed fluid, which becomes gaseous as the pressure in the coal bed is decreased. Kelso, Wicks, and Kuuskraa, *A Geologic Assessment of Natural Gas from Coal Seams in the Fruitland Formation, San Juan Basin* 45 (Gas Research Institute Topical Report 1988). But this phenomenon, where hydrocarbons change from a gas to a liquid or a liquid to a gas, is not a novelty in oil and gas leasing. Some hydrocarbons are gaseous when under pressure in the reservoir, but become liquids at atmospheric pressure: these are called condensate. Some, under a natural process called retrograde condensation, convert from gas to liquid while still in the reservoir, and at sufficiently low pressure may reconvert to gas. Still others become liquids when treated at a natural gas processing plant. Craft and Hawkins, *Applied Petroleum Reservoir Engineering* Chap. 2 (1959); Slider, *Practical Petroleum Reservoir Engineering Methods* Chap. 4 (1976); *Field Handling of Natural Gas* 26-27 (3rd ed. 1972) (Petroleum Ext. Serv., Univ. of Texas Austin). Yet all are "hydrocarbon substances" subject to royalty under ¶ 3(c) of Lease Form 5-157. *See generally Jicarilla Apache Tribe v. Supron Energy Corp., supra* (royalty due on both natural gas and liquid products). So, too, any methane which may be a con-

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[2] *Accord, Exxon Corp. v. Lujan*, 730 F.Supp. 1535, 1543-45 (D. Wyo. 1990), *appeal docketed* No. 90-8036 (10th Cir.) (carbon dioxide is a natural gas under sec. 28 of Mineral Leasing Act, relying in part on Solicitor's Opinion, M-36935).

densed fluid within the coalbed before production is a "hydrocarbon substance" subject to royalty.

Nor can we find that the word "deposit" was intended to exclude coalbed methane from the rights granted under the lease. "Deposit" has a common usage in the minerals industries. Its accepted meaning provides no basis to exclude methane found in coal from "oil and gas deposits." The Department's Bureau of Mines defines "deposit" as a term "used to designate a natural occurrence of a useful mineral * * * in sufficient extent and degree of concentration to invite exploration." *A Dictionary of Mining, Mineral and Related Terms* 313 (Bureau of Mines 1968). A "mineral deposit" is similarly defined as "a body of mineral matter in or on the Earth's surface which may be used for its industrial mineral or metal content." *Id.* at 710. In the oil and gas context, a "deposit" has been defined as "an accumulation of oil, gas or other minerals capable of production." Williams and Meyers, *Manual of Oil and Gas Terms* 146 (4th ed. 1976). All these definitions plainly include methane found in coalbeds as a "deposit" of gas, and none limit the term "deposit" by the structure or stratum in which it is found.[3]

On Federal lands, the Department has always used the phrase "oil and gas deposits" to refer to the full range of rights granted in an oil and gas lease. The phrase appeared in the first lease form implementing the Mineral Leasing Act of 1920, see 44 L.D. 447, 448 (1920), and has been used in subsequent forms.[4]

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[3] The word "deposit" had a similarly broad meaning in 1920, when Congress used it in the Mineral Leasing Act. *See* Fay, *A Glossary of the Mining and Mineral Industry* 211 (Dept. of the Interior 1920) ("the term mineral deposit or ore deposit, is arbitrarily used to designate a natural occurrence of a useful mineral or ore in sufficient extent and degree of concentration to invite exploitation").

[4] For example, for lease forms in use around the time this Jicarilla lease was executed, see Bureau of Land Management Form 4-213 (Dec. 1949), Form 4-213 (Feb. 1952), and Form 4-1097 (Jan. 1957).

Congress has used the phrase itself in that Act, authorizing the Secretary to lease lands "known or believed to contain oil or gas deposits." 30 U.S.C. § 226(a). This Office has previously indicated that grants of rights to oil and gas deposits include the rights to coalbed methane. 88 I.D. at 545-46. Given that there is no commonly used definition of "deposit" which supports a narrower view, we find no reasonable basis for construing the phrase "oil and gas deposits" differently when it appears in Indian leases, as opposed to Federal leases, on forms issued by this Department. *Accord, Navajo Tribe of Indians v. United States,* 364 F.2d 320, 324-27 (Ct.Cl. 1966) (phrase "oil and gas deposits" in Indian lease includes helium, even though helium is not a hydrocarbon gas).

We therefore find that paragraphs 1 and 10 of the lease unambiguously grant the right to produce coalbed methane.

II. Where the General Intent to Lease All Gas Is Clear, the Absence of Specific Intent to Include Coalbed Methane as a "Gas" Under This Lease Cannot Create a Reservation of That Gas

In cases interpreting whether an oil and gas lease grants rights to a certain kind of gas, it is common for a party to argue that it did not specifically intend to grant the right to that gas. In carrying out our trust responsibility to act in the best interest of the Tribe, we consider whether such an argument could be used to make what would otherwise appear to be clear language ambiguous. Two cases on ownership of coalbed methane have been decided since Opinion M-36935 was published. Neither provides a reasonable basis for relying on an absence of

"specific intent" to depart from the plain language of the lease.

The first case is an unreported decision of the Northern District of Alabama, Civ. No. 85-G-2261-W, affirmed without opinion by the Eleventh Circuit, *Rayburn v. USX Corp.*, 844 F.2d 796 (11th Cir. 1988). At issue was the language of a private warranty deed severing from the estate all minerals "except oil and gas." There the district court avoided deciding whether coalbed methane was a "gas" or whether it was a mineral severed from the estate. The district court also reviewed evidence of knowledge and usage of coalbed methane in the area at the time the deed was executed (slip op. pp. 2-4); but the court based its ruling solely "on the language of the deed in question." *Id.* at 4. The court determined that the two parties could not have intended for coalbed gas to be produced with other gas because the deed required that "all coal seams * * * penetrated in * * * [oil and gas] drilling operations shall be encased or grouted off." The district court stressed that its "decision * * * is not a declaration that in all instruments the interpretation will be the same." *Id.*

In the matter before us, we too base our interpretation on the language of the instrument, here the lease. That language, however, stands in contrast to the language of the deed in *Rayburn*. Here the lease does not require the oil and gas lessee to case off the coalbed, and instead requires the lessee to test the coalbearing Fruitland formation for gas production. "Special Stipulation A" required the lessee to drill a well within the first 5 years of the lease "to test thoroughly *all formations* down to and including the Point Lookout Sandstone." (Italics added). One of the formations above the Point Lookout Sandstone is the Fruitland Formation, in which the Fruitland

coalbeds were deposited.[5] Thus, under the stipulation, the lessee was obliged to test this formation to determine whether it could produce oil or gas in paying quantities. Given that the first coalbed methane well in the San Juan basin was completed in the Fruitland Formation just one year after this lease was executed,[6] it is difficult to argue that production of coalbed methane from this formation would be inconsistent with the terms of this lease.

The second case is a decision of the Supreme Court of Pennsylvania. Pennsylvania has adopted the rule that gas present in the coal belongs to the owner of the coal, but coalbed gas which has escaped into surrounding strata belong to the owner of those strata. *United States Steel Corp. v. Hoge*, 468 A.2d 1380, 1383 (Pa. 1983). *Hoge* concerned not a mineral lease, but a 1920 deed severing ownership of the coal from the other rights in the land. In the deed the grantor reserved the right "to drill and operate through said coal for oil and gas." The Pennsylvania Supreme Court's decision appears to have been powerfully influenced by its "strata" theory of ownership. Under that theory, "the surface of the land may be separated from the different strata underneath it, and there may be as many different owners as there are strata."

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[5] Fassett, "Coal-bed Methane—A Contumacious, Free-Spirited Bride; the Geologic Handmaiden of Coal Beds," p. 139, fig. 10. Fassett, an employee of the U.S. Geological Survey, published this article in *Energy Frontiers in the Rockies* (Albuquerque Geological Society 1989).

[6] "What has come to be recognized as the most famous Fruitland coalbed methane well in the San Juan Basin, the Phillips Petroleum Company No. 6-17 San Juan 32-7 Unit well * * *, was completed in 1953 * * * The well was completed open-hole in a thick sequence of interbedded Fruitland coal beds, sandstones, siltstones, and mudstones, between 3055 and 3240 [feet] * * * with no stimulation." Fassett, *supra* at 142.

Where, as here, the coal may be interbedded with other gas-bearing strata, it could be unusually difficult to seal off the coal or to account separately for gas produced from the coal and non-coal strata.

Chartiers Block Coal Co. v. Mellon, 25 A. 597, 598 (Pa. 1893). Accordingly, anything found in the coal stratum would belong to the owner of the coal. *Hoge*, 468 A.2d at 1383-84. Additionally, the court considered "the conditions existing at the time of [the deed's] execution" in 1920. "[A]t the time this coal severance deed was entered into, although commercial exploitation of coalbed gas was known such operations were very limited and sporadic." *Id.* at 1384. Furthermore, although coalbed methane and other natural gases "are found in the same geographic areas of Pennsylvania," the record before the court showed that "the gas which has commonly been referred to as 'natural gas' is generally found in strata deeper than coal veins * * * " *Id.* at 1382. Therefore, the court concluded, "[a]lthough the unrestricted term 'gas' was used in the reservation clause, * * * we find it inconceivable that the parties intended a reservation of all types of gas." *Id.* at 1384-85.

> We find implicit in the reservation of the right to drill through the severed coal seam for "oil and gas" a recognition of the parties that the gas was that which was generally known to be commercially exploitable. It strains credulity to think that the grantor intended to reserve the right to extract a valueless waste product with the attendant potential responsibility for damages resulting from its dangerous nature. * * * We find more logical and reasonable the interpretation offered by the Appellant that the reservation intended only a right to drill through the seam to reach the unconveyed oil and natural gas generally found in strata deeper than the coal.

Id. at 1385.

Under *Hoge*, Pennsylvania courts need not inquire whether the parties to the deed specifically intended to convey coalbed methane. Instead they are to look at the "language of the deed * * * in its entirety, giving effect to all its terms and provisions, and construing the language in light of conditions existing at the time of its execution." *Id.* at 1384. In the matter before us, we are not dealing with language reserving or granting a "right to drill and operate through said coal for oil and gas" that may lie beneath. Instead, we have unambiguous language granting rights to all gas deposits and to all forms of natural gas.[7]

There are aspects of *Hoge*, however, which render its analysis inapplicable to our inquiry. Most important is its reliance on a "stratum theory" of ownership. This theory is inapplicable to leases issued under the Indian Mineral Leasing Act. Under that law, the Secretary is not authorized to approve grants of fee rights to the various strata underlying the reservation. Instead, he is authorized to approve leases for "mining purposes." 25 U.S.C. §§ 396a, 396b. The rights granted are not fee rights, like those granted by severance deeds in Pennsylvania, but instead are rights needed to fulfill the purpose of the lease. Thus, the Tribe's lessee does not own the shales, the sandstones, the coal, or any other formation in which natural gas may be found. But it does own the rights to extract all the oil and natural gas.

Of lesser importance, but still significant, is that the court's interpretation of the deed is partly based on the geology of Pennsylvania, where the "conventional" gas reservoirs reportedly lie deeper than the coal seams. But as explained above, the coal seams in the San Juan Basin are often interbedded with the conventional reservoirs. So the inferences the Court drew from "conditions existing" in Pennsylvania, 468 A.2d at 1384, are not useful in the matter before us.

Several other cases have addressed whether various gases occurring in nature are "gas," "natural gas," or "gas deposits." Though none deal with coalbed methane, the

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[7] Indeed, as noted above, in the lease for Tract 178 "Special Stipulation A" requires that the lessee drill through and test the formation in which the coalbed lies.

gases have adopted a broad definition of these phrases as including even non-hydrocarbon gases. *E.g., Navajo Tribe of Indians v. United States*, 364 F.2d 320, 327 (Ct.Cl. 1966) (as matter of law, term "gas" in Indian oil and gas lease includes helium); *Northern Natural Gas Co. v. Grounds*, 441 F.2d 704, 714-15 (10th cir. 1971), *cert. denied*, 404 U.S. 951 (1971) (under State law, court looks to "general" intent of parties, grant of "gas" in lease includes helium).

On the question of the parties' specific intent with respect to coalbed methane, the *Navajo Tribe* case is the most instructive because it involves an Indian oil and gas lease. One of the issues there was whether a Navajo lease granting the rights to "all the oil and gas deposits" included the right to helium. The Tribe argued that "gas deposits" referred to hydrocarbon gases, that helium was not a hydrocarbon gas, and that the Government[8] had the burden of proving that the parties specifically intended for the lease to include helium. 364 F.2d at 325. The Tribe "point[ed] out that helium was not specifically mentioned in the 1923 lease and * * * that knowledge of helium was extremely limited during the period in question." *Id.*

The court rejected these arguments. The helium was found in reservoirs commingled with the hydrocarbon gases, and the two could not be separated before they were produced.[9]

> Perhaps, plaintiff [the Tribe] would impose upon the lessee an obligation to produce the gas, extract the helium and deliver the refined helium to the lessor.

[8] The United States had entered into an agreement with the Navajo and its lessee, under which the United States took control of the lease. 364 F.2d at 320, 324. The Tribe argued that the lease had not granted rights to the helium, and therefore claimed the Government had unlawfully produced and removed the helium.

[9] As indicated in note 6 above, this can also be true of coalbed methane and other natural gas when the coal seams are interbedded with other reservoir rocks.

> * * * However, the lease in question contains no such provisions, and there is no basis for holding that such an understanding arose by implication. * * * Although the parties to the lease may have been thinking mainly of fuel-type gases, it is still more realistic to presume that the grant included not only hydrocarbons but the other gaseous elements as well. * * * To summarize, plaintiff's "specific intent" theory must be rejected.

364 F.2d at 326-27.[10] The court recognized that ruling against the Tribe on this isue appeared "inconsistent with the notion that ambiguities in oil and gas leases are to be construed in favor of the lessor." *Id.* at 327. But the plaintiff's interpretation of the lease "would be in conflict with the general intent of the parties." *Id.*

Even if it could be shown that coalbed methane was not economically or technologically producible when this lease was issued in 1952, the circumstances would not appear germane to the proper interpretation of the lease. When the lease was signed, the parties knew that the lessee might discover a gas deposit (even of the "conventional" kind) which would not have enough gas to make production economically feasible at that time. But the lease did not limit the grant to those deposits of gas appearing economically producible in 1952. It granted rights to "all" deposits. In *Utilities Production Corp. v. Carter Oil Co.*, 2 F.Supp. 81 (N.D. Okla. 1933); *aff'd* 72 F.2d 655 (10th Cir. 1934), the court stated in relevant part:

[10] The court added that plaintiff probably would not prevail even under a specific intent theory. Although the evidence regarding the circumstances at the time of the signing of the 1923 lease is scant, there appears to be some merit in defendant's view that the existence of helium was generally known. Also, it is significant that the Department of the Interior acted for the tribe and certainly the Department was familiar with helium. 364 F.2d at 327. In the matter before us, the existence of methane in coal was generally known in 1952, and it is clear from Stipulation A in the lease for Tract 178 that the Department was very familiar with the geology of the San Juan basin.

> * * * improved methods of drilling and producing are necessary for the successful operation of the leases, and it was undoubtedly within the contemplation of the parties to the leases that improved and modern methods should be used for the production of oil from the lands which would be advantageous to both the lessor and the lessee. * * *

2 F.Supp. at 86. A lease takes into consideration improving methods of development.

Furthermore, in this respect there is a similarity between coalbed methane and geothermal steam. In *United States v. Union Oil Co. of California,* 549 F.2d 1271 (9th Cir. 1977), the court found that although the Stock-Raising Homestead Act of 1916 did not specify geothermal resources in its reservation of "coal and other minerals," the language in the Act was sufficient to "encompass geothermal resources." *Id.* at 1274. This was so even though Congress had given no thought to geothermal steam in 1916.

> There is no specific reference to geothermal steam and associated resources in the language of the Act or in its legislative history. The reason is evident. Although steam from underground sources was used to generate electricity at the Larderello Field in Italy as early as 1904, the commercial potential of this resource was not generally appreciated in this country for another half century. * * * Congress was not aware of geothermal power when it enacted the Stock-Raising Homestead Act in 1916; it had no specific intention either to reserve geothermal resources or to pass title to them.

Id. at 1273. But Congress's intent in the legislative history was "to retain subsurface resources, particularly mineral fuels, in public ownership for conservation and subsequent orderly disposition in the public interest." *Id.* at 1274. In addition to this general intent, the court

found that each of the elements of geothermal resources could be considered a mineral. *Id.* This case illustrates that a resource, not perceived as valuable when a reservation was originally made, could be found included in a reservation merely through the general language of the reservation. Thus, "geothermal resources" or "coalbed methane," though their value may not have been originally foreseen, can easily fall within the broader language of a lease grant or patent reservation.

Here, the general intent of the parties to include all natural gases is clear from the express terms of the lease. As the *Navajo Tribe* and *Union Oil* cases teach, it is irrelevant that the parties may not have specifically intended to include coalbed methane or that the resource was not economically recoverable when the lease was executed. This conclusion is consistent with the purpose of the Indian Mineral Leasing Act. As the Supreme Court has indicated, "a purpose of the 1938 Act is to provide Indian tribes with badly needed revenue." *Cotton Petroleum Corp. v. New Mexico, supra* at 1709. Coalbed methane produced under this lease will earn the Tribe royalties at the rate of 12½ percent of the value or amount of the production. Additionally, the production is subject to the Tribe's power to impose a severance tax. *See Merrion v. Jicarilla Apache Tribe,* 455 U.S. 130 (1982). The Tribe will therefore receive substantial revenues from coalbed methane produced under this lease.

III. The Lessee's Right to Produce the Coalbed Methane Is Subject to Regulation to Protect the Coal

As we indicated above, while the lessee here has the right to extract methane found in the coalbeds of the San Juan Basin, it does not have the right either to extract the coal or to cause unauthorized damage to the coal resources without compensating the Tribe. Coalbed gas extraction techniques may, in some cases, damage the coal seam and render the coal unminable or more expensive to mine,

thus discouraging future development. We therefore believe a few observations are in order concerning the lessee's duties with respect to the lessor's coal.

As the Department noted in Solicitor's Opinion M-36935,

> an oil and gas lessee does not have a license to develop the coalbed gas resource in any manner. * * * Should the lessee propose any drilling which would in the judgment of the Geological Survey cause damage to the coal deposit or create a safety hazard for subsequent coal mining, the application to drill may be denied. * * * We are prepared to render any further advice you may deem appropriate regarding legal issues raised by * * * the possibility that coalbed gas development could harm or preclude subsequent recovery of the coal.

88 I.D. at 549-50. The coal in the San Juan Basin within the Jicarilla reservation apparently is not currently regarded as a resource which can be mined economically. However, the economics of mining this coal may change to the Tribe's benefit in the years ahead; and the Department should have due regard for this possibility when reviewing an oil and gas lessees's application for permission to complete a well in the coalbed.

The statutes, regulations, lease provisions, and case law have put lessees on notice that the Department will take all necessary actions to protect tribal resources. The lease for Tract 178 contains several provisions concerning the protection of the Tribe's coal resources. For example, ¶ 3(f) requires the lessee "to carry on all operations hereunder in a good and workmanlike manner in accordance with approved methods and practice, having due regard for * * * the preservation and conservation of the property for future productive operations * * *" That paragraph also requires the lessee to "carry out at the expense of the lessee all reasonable orders and requirements of the oil and gas supervisor relative to prevention of waste, and preservation of the property * * *"

Paragraph 8 provides the Department with broad authority to enforce those obligations:

> the Secretary of the Interior may impose restrictions as to time or times for the drilling of wells and as to the production from any well or wells drilled when in his judgment such action may be necessary or proper for the protection of the natural resources of the leased land and the interests of the Indian lessor * * *

Paragraph 3(g) commits the lessee to honor "any and all regulations of the Secretary of the Interior now or hereafter in force relative to such leases," other than rules concerning the royalty rate or annual rental. The "Forest and Land Protection Stipulations" attached to this lease further protect the Tribe by requiring the lessee, in ¶(2), to reimburse the Tribe "for any and all damage to or destruction of property of the lessor caused by lessee's operations hereunder and not authorized by this lease * * * "

The regulations provide similar authorities and protection. 25 CFR 211.19, 211.20, and 211.21 (1989). Specifically, "[i]n the exercise of his judgment the Secretary * * * may take into consideration, among other things, the Federal laws, State laws, * * * and any regulatory action desired by tribal authorities." 25 CFR 211.21(a).

Before approving drilling permits for wells on the lease, the Department, pursuant to the Federal Government's trust responsibility to protect tribal resources, needs to satisfy itself that the proposed activities will be carried out with due regard for possible future coal mining operations.

CONCLUSION

For the reasons stated in Parts I and II of this opinion, we find that the lease form used for Tract 178 unambiguously granted to the lessee the right to produce coalbed methane.

THOMAS L. SANSONETTI
SOLICITOR

APPENDIX H

DEPARTMENT OF THE INTERIOR

DEPARTMENTAL MANUAL

Delegations — Part 209 Secretarial Officers

Chapter Solicitor — 209 DM 3.1

3.1 *General Authority.* Subject to the limitations contained in 200 DM 1 the Solicitor is authorized to exercise all of the authority of the Secretary, including, but not limited to:

A. All the legal work of the Department,

B. The authority to issue amendments of and additions to the material in the Code of Federal Regulations,

C. The administration of the oath of office or any oath required by law in connection with employment.

3.2 *Authority in Specified Matters.*

A. The responsibilities of the Solicitor in 209 DM 3.1A include but are not limited to the authority:

(1) Conferred by the provisions of 28 U.S.C. 2672, with respect to tort claims;

(2) With respect to claims under 25 U.S.C. 388, for damage arising out of the survey, construction, operation, or maintenance of irrigation works on Indian irrigation projects; and under Public Works for Water Appropriation Acts, for damage to or loss of property, personal injury, or death arising out of activities of the Bureau of Reclamation;

(3) With respect to the disposition of appeals to the Secretary:

(a) Involving estates of Indians of the Five Civilized Tribes and Osage Indians;

(b) From decisions of the Appellate Division of the High Court of American Samoa, which affirm sentences of death pursuant to section 3.0505, as amended, of the Code of American Samoa (1961 Ed.);

(4) To supervise, administer, and control all activities within or on behalf of the Department relating to intellectual property including patents, inventions, trademarks, and copyrights;

(5) When acting upon a proposal by a bureau, to acquire real estate for the United States by condemnation pursuant to section 1 of the Act of August 1, 1888, as amended (40 U.S.C. 257) whenever in the opinion of the Solicitor it is necessary or advantageous to the Government to do so and to submit to the Attorney General of the United States applications for the institution of proceedings for condemnation;

(6) Under section 1 of the Act of February 26, 1931 (40 U.S.C. 258a), to sign declarations of taking;

(7) When acting upon a proposal to acquire real estate for the United States pursuant to section 3 of the Helium Act (50 U.S.C. 167a) by condemnation pursuant to section 1 of the Act of August 1, 1888, as amended (40 U.S.C. 257) whenever the Solicitor determines that a satisfactory agreement to acquire such land or interests in land cannot be made and that such acquisition by condemnation is necessary in the national interest and to submit to the Attorney General of the United States applications for the institution of proceedings for condemnation;

(8) Under 43 C.F.R. Part 2, with respect to the availability of official records and testimony of employees;

(9) With respect to the settlement of claims against the United States by employees for damage to, or loss of personal property pursuant to the Military Personnel and Civilian Employees Claims Act of 1964, as amended (31 U.S.C. 240-243);

(10) With respect to claims arising under the Act of March 9, 1920 (46 U.S.C. 742, 747, 749 and 750), as amended by Public Law 92-417, also known as the Suits in Admiralty Act; and

(11) To issue final legal interpretations, in the form of M-Opinions published in Decisions of the United States Department of the Interior, on all matters within the jurisdiction of the Department, which shall be binding, when signed, on all other Departmental offices and officials and which may be overruled or modified only by the Solicitor, the Under Secretary, or the Secretary.

B. The Solicitor is authorized:

(1) To determine, compromise, and settle claims and demands of the United States pursuant to section 12 of the Act of August 20, 1937, as amended (16 U.S.C. 932k);

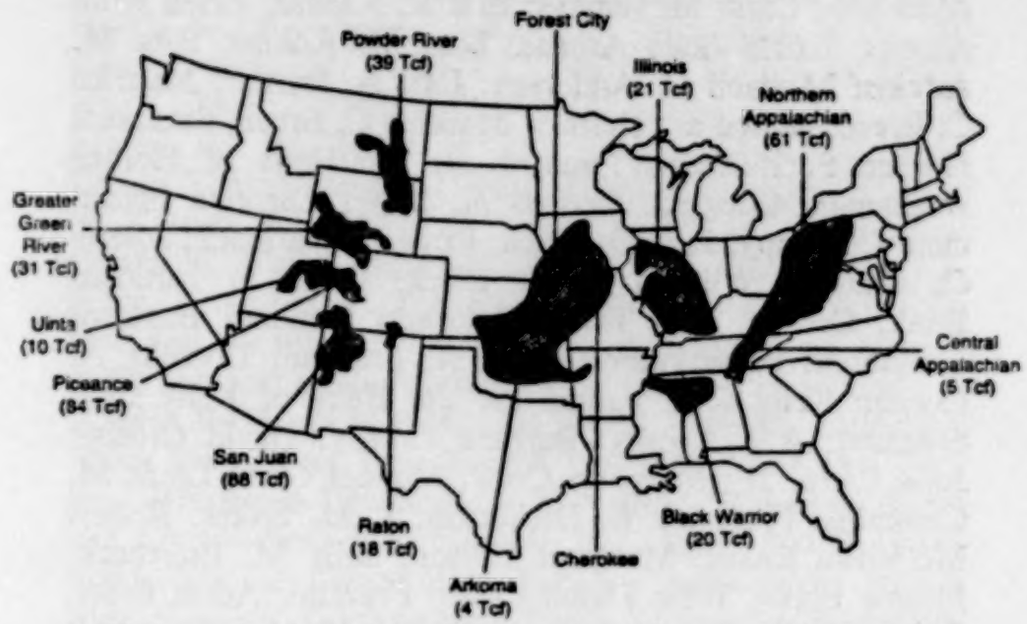
(2) If he determines in connection with a claim under a contract that, as a matter of justice and equity, all or any part of the liquidated damages assessed on or after July 1, 1949, because of delay, against a party to a contract made by the Department on behalf of the Government should be remitted, to recommend to the Comptroller General that such remission be made, pursuant to the provisions of 41 U.S.C. 256a;

(3) To accept on behalf of any Secretarial Officer service of judicial process and service of process issued by the legislative branch of the Government.

3.3 *Authority to Redelegate.* The Solicitor may, in writing, redelegate or authorize written redelegation of any authority delegated to him in this chapter except where prohibited by statute, Executive Order or limitations established by other competent authority. However, the Solicitor may redelegate the authority described in 209 DM 3.2A(11) only to a Deputy Solicitor.

APPENDIX I

Major U.S. Coalbed Methane Resources



Source: Gas Research Institute, *A Guide to Coalbed Methane Reservoir Engineering*, GRI Topical Report No. GRI-94/0397 (1994).

APPENDIX J

NAMED PETITIONER CLASS MEMBERS

Amoco Production Company; Shirley K. Adams; Henry Ashworth; Carla M. Aspaas; Eric K. Aspaas; Helen Ruth Aspaas; Laura Belle Aspaas; Leta M. Adkins; Rita M. Adkins; Maxwell C. Anderson; Earl A. Barker; Maurice C. Breen, named as: Heirs of Maurice C. Breen, deceased; Horace F. Buchanan, named as: the Heirs of Horace Buchanan, deceased; George A. Bugg; Carbone Investment Company; Jack Carmack; Rowland Carmack; Joseph C. Ciancio; William Kemp Clark; Colorado National Bank, George Veto Trust; Colorado National Bank of Longmont, conservator Gladys N. Frazzini; Dorothy A. Corgin; Kelly Cox, named as: the Heirs of Kelly Cox, deceased; A.B. Crosby; Barbara Crosby; David Crosby; John Crow, Jr.; Margaret Crow; Manuel Cruz; Louis M. Cummins; Frederick E. Dickerson; J. M. Eakes; Robert McFerran Eakes; Margaret Ellison; Sally M. Etterbeck; Minnie Flaks; Tillie Flaks; Cassio Frazzini; Adele Frost; Robert Galbasin; Abel S. Gallegos; Montey Garnand; Ruby Gibbs Goggans; Christine Hamilton; Hardin Simmons University; H.A. Harmon, named as: the Heirs of H.A. Harmon, deceased; Katherine Frances McElvain Harvey; the shareholders of Hondo Oil & Gas Company (dissolved); Hyde Oil And Gas Corporation; Charles Kettering; Fidel Lucero; Richard C. Malcomb; Suzanne Heath Manges; Catherine B. McElvain; Mabel McElvain; Thornton H. McElvain, Jr.; Dorothy N. McKelvey; Edwin L. McKelvey; R. Franklin McKelvey; W. R. McMahon; McMurry Oil Company; W. Clay Meredith Charitable Trust; W.A. Moncrief, named as: the Heirs of W.A. Moncrief, deceased; Roy E. Montgomery, personal representative for the Estate of W. Clay Meredith, deceased; Forrest D. Miller, named as: the Heirs of Forrest D. Miller, deceased; Helen L. Miller, named as: the Heirs of Helen L. Miller, deceased; Thomas S. Morrissey; Thomas J. Morrissey; Emil Mosbacher; Emil Mosbacher III; John David Mosbacher; R. Bruce Mosbacher; Myra Theresa Moulds; North Central Oil Corporation; H.L. Oliver;

Clara Onofrio; Margaret C. Pargin; Harold F. Payne, Jr.; Neville G. Penrose; Ben M. Peterson, Jr.; Frederick Petrocco; Phillips Petroleum Company; James M. Raymond; W. E. Rennie, named as: the Heirs of W. E. Rennie, deceased; Thomas C. Romolo; Benton E. Smullyen; Clinton I. Smullyen; William Stirling; J. L. Tatum, named as: the Heirs of J.L. Tatum, deceased; Anna Carleo Tomeo; Ernest Tomeo; Turner Securities; Richard W. Turner, Sr.; George C. Vance, named as: the Heirs of George C. Vance, deceased; Anthony H. Veto; Joseph F. Ware, Jr.; Albert E. Zarlengo; Anthony F. Zarlengo, John Doe and all other unknown persons claiming an interest in the mineral estate located within the N/2 of section 12, T33N, R8W, N.M.P.M., La Plata County, Colorado; Amax Oil & Gas, Inc.; Bowen/Edwards Associates, Inc.; Fuel Resources Development Company; McKenzie Methane Corporation; Meridian Oil, Inc.; Mobil Oil Corporation; National Cooperative Refinery Association; Northwest Pipeline Corporation; Pablo Operating Company; Palo/Eagle Joint Ventures; Richmond Petroleum, Inc.; Williams Production Company; Union Texas Petroleum Corporation, John Doe Oil Company and all other unknown persons or entities claiming leasehold working interests or operating rights to explore for, produce or develop coalbed methane or coal constituents from coal or coal strata reserved by the United States in patents issued under the Act of March 3, 1909, or the Act of June 22, 1910, for lands located within the exterior boundaries of the Southern Ute Indian Reservation, and which entities have not obtained tribal consent to and federal approval of said exploration, production or development activities; Class of Defendants situated similarly to those named non-governmental defendants who claim ownership of an interest in coalbed methane and other coal constituents or claim the right to explore for, develop or produce those substances from coal or coal strata reserved by the United States in patents issued under the Act of March 3, 1909, or the Act of June 22, 1910, for lands located within the exterior boundaries of

the Southern Ute Indian Reservation and which class members have not obtained tribal consent to and federal approval of said interests of rights; Jack Balle; J.M. Huber Corporation, Oil & Gas Division; Mary Jean Balle; Donald C. Ciancio; Susie M. Ciancio; NCNB Texas National Bank, as trustee of the Kelly Cox Testamentary Trust; Addie G. Crosby; Jack W. Crosland, Jr.; Henry L. Enochson; Mary Jane Enochson; J.L. Goggans; Liberty Tulsa, as trustee of the Christine J. Hamilton Trust; Helen Crosland Hendricks; Thomas L. Johnstone; James Eric Kaindl; Larry James Kaindl; Lisa Jean Kaindl; Jane P. Mosbacher, named as The Heirs of Jane P. Mosbacher, deceased; PM Associates, a Colorado general partnership; First Interstate Bank of Denver, as Co-trustee of the Estate of W.E. Rennie est W.E. Rennie; Roderick L. Turner; Wells Fargo Bank, as trustee of the George C. Vance Trust; Albert E. Zarlengo, Jr., as trustee for the Albert E. Zarlengo Trust; Bell South Corporation Health Care Trust; J. Magness, Inc.; SG Interests I, Ltd; Mosbacher U.S.A., Inc.; Land Owners Coalseam Committee.

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SUPREME COURT, U.S.

No. 98-830

In The

Supreme Court of the United States

October Term, 1998

AMOCO PRODUCTION COMPANY,
on behalf of itself and the class it represents,

Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,

Respondent.

On Petition For A Writ Of Certiorari To The United States Court Of Appeals For The Tenth Circuit

BRIEF IN OPPOSITION

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QUESTIONS PRESENTED

1. Whether the United States retained ownership of the coalbed methane inherently contained in underground coal when Congress reserved "coal deposits" to the United States in lands subject to limited, agricultural patents under the 1909 and 1910 Coal Land Entry Acts, 30 U.S.C. §§ 81, 83-85.

2. Whether the Court of Appeals erred under *Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984), in not affording binding deference to a 1981 Department of the Interior Solicitor's opinion that: (1) was rendered without public notice-and-comment; (2) was found by the Court of Appeals to be arbitrary; (3) did not address the precise issue before the court; and (4) was not treated as binding by the Department of the Interior on the question before the court.

PARTIES TO THE PROCEEDING

The petition does not accurately list the parties to the proceeding. The petition lists Tiffany Gas Company as the sole defendant who was not an appellee below.

As a result of settlements reached and related orders of dismissal entered prior to the filing of plaintiff's interlocutory appeal below, the following named defendants and unnamed members of the defendant class, listed in chronological order of dismissal, were also not appellees: MarkWest Energy Partners, Ltd.; McKenzie Methane Corporation; SG Interests II, Ltd; Union Texas Petroleum Corporation; Union Texas Petroleum Energy Corporation; Conoco, Inc.; SG Interests I, Ltd.; Bellsouth Corporation Health Care Trust; Pablo Operating Company; Patricia Penrose Schieffer, individually and as Successor Trustee of the Patricia Penrose Schieffer Testamentary Trust; J. Thomas Schieffer, individually and as attorney-in-fact for the Patricia Penrose Schieffer Testamentary Trust; Greta B. Layton Schutt, Mercantile-Safe Deposit & Trust Company, Charles T. Peters, Jacques T. Schlenger, individually and as Co-Trustees of the Donaldson Brown Trust of March 25, 1965; Palo Petroleum, Inc.; and Meridian Oil Inc.

Following the filing of plaintiff's appeal below, but prior to the entry of judgment, the following defendants also reached settlement with the plaintiff and were dismissed from the proceeding: Anthony F. Zarlengo and Emerald San Juan Company, L.P.

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STATEMENT OF THE CASE

Petitioners seek review of the decision of the Tenth Circuit Court of Appeals holding that Respondent Southern Ute Indian Tribe ("Tribe") owns the coalbed methane ("CBM") inherently part of the Tribe's underground coal deposits (Pet.App. 1a-51a). Petitioners also ask the Court to review the Court of Appeals' ruling that an opinion of the Solicitor of the Department of the Interior was not entitled to deference under either *Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984), or *Skidmore v. Swift & Co.*, 323 U.S. 134 (1944) (Pet.App. 52a-94a). Although this case has been pending for seven years, the decisions below complete only a preliminary phase of the case, and on remand, the District Court will be required to consider defenses raised by Petitioners to defeat recovery by the Tribe, a claim by the Federal Defendants that they are indispensable parties against whom the case is barred by a statute of limitation, as well as possible declaratory, injunctive and compensatory remedies associated with the Tribe's claims for trespass.

In making its decision, the Court of Appeals construed the 1909 and 1910 Coal Land Entry Acts and the scope of the coal estates and non-coal estates severed thereunder. Act of March 3, 1909, ch. 270, 35 Stat. 844 (codified at 30 U.S.C. § 81) ("1909 Act"); Act of June 22, 1910, ch. 318, 36 Stat. 583 (codified at 30 U.S.C. §§ 83-85) ("1910 Act") (together "the Acts").[1] The Acts, which in

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[1] Codified versions of the 1909 Act and the 1910 Act are reprinted in the Appendix to Petition for Certiorari ("Pet.App.") 133a-136a. Copies of the Acts as originally printed in the Statutes at Large are set forth in the Appendix to Respondent's Brief in Opposition ("R.App.") 1a-5a.

this case apply to approximately 200,000 acres of land within the Southern Ute Indian Reservation ("Reservation"), permitted agricultural settlers for the first time to enter upon federal lands known to contain valuable coal deposits, which lands previously had been off-limits to agricultural patenting. The 1909 Act conditioned non-mineral entry onto certain designated coal lands upon the settlers making a statutory election to receive limited patents, which reserved to the United States "all coal in said lands, and the right to prospect for, mine, and remove the same." (Pet.App. 133a). The 1910 Act expanded the designated coal lands open for agricultural patenting, subject to a reservation of coal estates on terms effectively identical to those set forth in the 1909 Act (Pet.App. 135a). Even though Petitioners admittedly own no interest in the "coal deposits" expressly reserved under the Acts and now owned by the Tribe, Petitioners claim absolute rights to drill into the Tribe's coal, to inject fracturing agents under tremendous pressure to crack the coal, and to extract CBM trapped in the micropores of the underground coal deposits, in short, to destroy the coal (Pet.App. 19a n.10 (describing CBM production techniques)).

A. Factual Background

1. Coal and Coalbed Methane

The Tribe's Reservation contains vast bituminous coal beds created through the geologic process of coalification which transformed the fossilized remains of forests

into coal. Like the ancient forests from which they developed, these coal deposits are a diverse and complex mixture of a multitude of substances stratified under tremendous weight and pressure. Many of coal's constituents, when removed from the coal and brought to the surface, are considered to be liquids or gases. Among coal's constituents are hydrocarbons. One such hydrocarbon is bitumen – a liquid; another is methane – a gas. There are dozens more.

2. The Tribe's Reservation and Emergence of CBM as a Commercial Resource

The Tribe's Reservation is a remnant of its aboriginal lands now comprising approximately 700,000 acres of land held in checkerboarded and severed ownerships. *See* Act of May 21, 1984, Pub. L. No. 98-290, 98 Stat. 201 (confirming exterior boundaries of Reservation). The Reservation is located in southwestern Colorado on the northern edge of the San Juan Basin. Since the late 1940's, the Reservation has been an area of active conventional oil and gas exploration. Extensive conventional natural gas production has occurred within three geologic formations located beneath the Tribe's coal.

Historically, Reservation oil and gas development was undertaken by companies who leased oil and gas lands from private landowners or, in some cases, from the Tribe under the active supervision of the Department of the Interior ("Department") pursuant to federal law. *See* 25 U.S.C. §§ 396a-396g; 25 U.S.C. §§ 2101-2108. Prior to 1985, the Tribe depended almost entirely on the Bureau of Indian Affairs ("BIA") and Bureau of Land Management

("BLM") for technical assistance and for ensuring oil and gas lease compliance. Concerned that those agencies lacked the resources to manage tribal resources properly, the Tribe in 1974 halted the leasing of its lands. However, ongoing drilling and production activities under pending leases and pooling arrangements between operating companies continued to require active federal management. Although the Tribe opened a one-man energy office in the spring of 1980, tribal oil and gas leasing did not resume until 1986, with the development of a tribal technical staff.

In the early 1980s, when the Tribe was taking its first steps into the world of energy resource development, the Department of Energy and the Bureau of Mines were already engaged in experimental development of CBM, a new, non-conventional resource. At that time, "much of the natural gas industry considered coalbed methane to be nothing more than a coal mining industry problem." Richard A. Schraufnagel and Paul S. Schafer, *The Success of Coalbed Methane, reprinted in A Guide to Coalbed Methane Engineering* 1.2 (1995). Although the presence of large volumes of gas naturally trapped in coal had been known and commented upon for hundreds of years, commercial CBM extraction and development were impractical because of the limited permeability of coal and the universal presence of water in coal.

Oil companies understood that development of CBM raised serious questions regarding its ownership. As early as 1975, Amoco's own lawyers advised that prior to commencing CBM extraction, Amoco should "obtain from the owner of the coal rights authority to conduct

these operations." Amoco Memorandum from H.O. Hickman to Leo M. Brady at 2 (Aug. 27, 1975), *Tribe's Cross Motion for Summary Judgment* Exhibit 5-A (Sept. 7, 1993). Amoco's failure to follow that advice ultimately resulted in the present litigation.

3. Formulation of the 1981 Solicitor's Opinion

The issue identified by Amoco's counsel assumed far greater urgency when several years later the United States Geological Survey ("USGS") denied Amoco's request to drill CBM wells under the authority of federal oil and gas leases on federal lands in other parts of Colorado and Wyoming. This denial eventually led to issuance of an opinion by the Solicitor for the Department suggesting that CBM on federal lands should be developed under federal oil and gas leases rather than coal leases. *Ownership of and Right to Extract Coalbed Gas in Federal Coal Deposits*, No. M-36935, 88 Interior Dec. 538 (1981) ("1981 Solicitor's opinion") (*reprinted in* Pet.App. 140a-159a.).

Petitioners decline to mention their involvement in procuring the 1981 Solicitor's opinion on which they now place such great reliance (Pet.App. 158a). Following the USGS's denial of Amoco's CBM drilling requests, Amoco sought to reverse the decision within the Department. Aplt.App. at 2038.[2] Although Amoco filed its appeals

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[2] "Aplt.App." refers to Appellant's Appendix filed by the Tribe with its opening brief before the Tenth Circuit panel on March 27, 1995. As the pages in the Aplt.App. are sequential, the Tribe refers herein to the page number in the Aplt.App. when

with the Interior Board of Land Appeals, the Solicitor took up the issue. During the Solicitor's consideration, Amoco sent a telegram and letter to the Secretary of the Interior and Amoco's public affairs director wrote a "personal and confidential" letter to the BLM Director supporting Amoco's position. Aplt.App. at 2051, 2055, 2059. Amoco also filed a lawsuit against the Department, having confidentially described the case as a "friendly lawsuit" in its letter to the BLM Director. Aplt.App. at 638, 2059. Shortly after Amoco filed its lawsuit, the Solicitor issued his opinion construing the 1909 and 1910 Acts as Amoco wished. At the request of the Secretary, the Solicitor sent the opinion to Amoco, along with his apologies for the "delay" in its issuance. Aplt.App. at 2061. Amoco then dismissed its lawsuit against the Department. In contrast to Amoco's participatory role, there was no tribal involvement with the Department in the opinion's preparation. Nor is there any evidence that those within the Department charged with the responsibility for the protection of tribal interests played any role whatsoever.

The issuance of the 1981 Solicitor's opinion, however, did not eliminate the uncertainties over CBM ownership. As Amoco's lawyers recognized:

> The presence of segregated coal interests also increases business risk. This situation arises when a divided coal interest is created by a patent reservation . . . . In order to reduce the likelihood of subsequent litigation, the preeminence of potentially competitive claims (coal versus oil and gas) should be settled between the claimants in advance of drilling. Failure to do so may result in loss of the investment . . . .

referencing documents in the record before the Court of Appeals.

Aplt.App. at 1432. Additionally, title opinions written in anticipation of drilling into tribal coal deposits regularly warned Amoco and other company defendants that, despite the 1981 Solicitor's opinion, ownership of CBM remained uncertain (Pet.App. 80a n.20). Rather than settling the Tribe's "competitive claims" in "advance of drilling" as advised, Petitioners chose to proceed and assume the risk of invalid title. Indeed, even when the Pennsylvania Supreme Court reversed the lower court decision on which the Solicitor had placed substantial reliance in his 1981 opinion, Amoco did not blink at going forward. *See United States Steel Corp. v. Hoge*, 468 A.2d 1380, 1384 (Pa. 1983) ("[T]he coal owner may mine his coal, extract the gas from it, or both.").

Certainly, the Department never viewed the 1981 Solicitor's opinion as determinative of the ownership issue on tribal lands. Nothing in the opinion expressly stated that it applied to tribal lands, and on the Reservation, the BIA routinely did not apply the opinion to the Tribe's mineral interests.[3] For example, the Tribe through

[3] In 1990, the Solicitor applied the portions of his 1981 opinion discussing the relationship of CBM to coal to conclude that tribal leases granting the right to develop oil and gas were sufficient to grant rights to develop CBM where the Tribe owned the entire mineral estate. *Rights to Coalbed Methane Under an Oil & Gas Lease for Lands in the Jicarilla Apache Reservation*, No. M-36970, 98 Interior Dec. 59 (1990) (*reprinted in* Pet.App. 160a-177a). That opinion did not, however, address 1909 and 1910 Act lands.

its energy resource office requested that communitization agreements between tribal lessees and lessees of lands involved in this case expressly reserve the Tribe's right to CBM in severed coal estates. Commencing in 1988, the Department approved 162 communitization agreements signed by oil and gas companies and reserving the Tribe's rights to CBM. Aplt.App. at 2072, 2073; Supp.App. at 455.[4]

B. The District Court Proceedings

Shortly after the filing of this case, the District Court certified a defendant class consisting of all persons, other than governmental entities, claiming an interest in CBM underlying lands patented within the Reservation pursuant to the 1909 and 1910 Acts. The District Court bifurcated the case and defined two threshold issues: first, the Tribe's statutory ownership claim ("Class Action Claim"); and, second, the existence and applicability of a variety of defenses assertedly common to all members of the defendant class raised as a bar to the Tribe's Complaint ("Class Action Defenses"). Discovery proceeded solely on those two threshold questions. With the exception of those issues, the District Court stayed "all discovery and all other proceedings in this action (including the filing of cross-claims and counterclaims, the determination of the Tribe's remedies, if any . . . [and] the assertion of individual defenses . . . .)." Aplt.App. at 180-81. The District Court has never lifted that stay. The District Court also

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[4] "Supp.App." refers to the Supplemental Appendix filed with Appellee's response brief before the Tenth Circuit panel on May 19, 1995.

issued an order addressing interim activities on the lands affected by this lawsuit allowing existing activities to continue free of any claim of bad faith trespass or punitive damages and setting conditions to protect those who engage in new activities from certain tribal claims. Aplt.App. at 259-64. Until the District Court amends the case management orders, producing companies are assured good faith trespasser status for ongoing operations. Aplt.App. at 570-75.

Following limited discovery, the parties filed cross motions for summary judgment on the two bifurcated issues. On September 13, 1994, the District Court entered summary judgment resolving the Class Action Claim against the Tribe and in favor of the named defendants and defendant class (Pet.App. 95a-132a). The District Court did not rule on the Class Action Defenses. In addition, the District Court did not address the Federal Defendants' argument that a statute of limitation barred the case against them (Pet.App.130a-131a). In declining to dismiss the Federal Defendants, the District Court noted that, because some duty might require federal mitigation of damage to coal strata, the court's decision on ownership did not dispose of the entire case against them: "other issues concerning these defendants remain for a later day." (Pet.App. 131a). The Tribe appealed.

C. The Panel Decision

The three-judge appellate panel began its analysis by reviewing the relevant statutory language (Pet.App. 60a). The panel considered and rejected Petitioners' contention that the text of the Acts revealed a specific congressional

intent to convey CBM to agricultural entrymen (Pet.App. 61a-66a). Instead, the panel concluded that "the text of these acts gives us no particular indication of Congress' *specific intent* with regard to [CBM]." (Pet.App. 65a). The panel then examined the general purposes of the grant and reservation through analyses of the enactments' historical context and legislative histories (Pet.App. 66a-77a). The panel concluded that Congress passed the Acts to accommodate two competing national interests: alleviation of the hardship to settlers resulting from the withdrawal of increasing amounts of coal land from agricultural entry; and congressional intent to preserve "both the present and future economic value of coal," including the value that might be realized under future technology (Pet.App. 66a-77a).

The panel then turned to the rule this Court has employed repeatedly over the last century to resolve ambiguities in public land laws, that " '*nothing passes except what is conveyed in clear language*' " and that " 'ambiguity or uncertainty in the terms employed [in land grants] should be resolved in favor of the government.' " (Pet.App. 59a (quoting *Watt v. Western Nuclear, Inc.*, 462 U.S. 36, 59 (1983); *Burke v. Southern Pac. R.R.*, 234 U.S. 669, 680 (1914)). In the absence of a specific intent to convey CBM, and because retention of CBM was consistent with the general purposes of the Acts, the panel employed the rule of public land law construction to suggest that "CBM trapped in coal is included in the reservation of coal to the United States." (Pet.App. 76a (footnote omitted)).

The panel did not end its analysis at that point, however. Instead the panel engaged in a "discriminating

analysis" of whether *Chevron* or general principles of deference required the court to adopt the interpretation of the Acts reflected in the 1981 Solicitor's opinion (Pet.App. 78a). Noting that the 1981 Solicitor's opinion had been "promulgated without notice and comment" and that adherence to the opinion in this case would have a "retroactive impact on private rights" conveyed decades before its promulgation, the panel questioned "whether this is the sort of decision *Chevron* is meant to enshrine." (Pet.App. 78a, 80a (footnote omitted)). In addressing that question, the panel initially assumed for purposes of its analysis that Congress had delegated to the Department the authority to issue binding interpretive decisions in its administration of lands subject to the Acts.[5] After reviewing existing case law, the panel concluded that in order to obtain binding force under *Chevron*, an agency's formulation of an interpretive decision must provide the procedural protections inherent in agency legislative rulemaking or administrative adjudication (Pet.App. 83a-88a). Because promulgation of the 1981 Solicitor's opinion provided no procedural protections to persons who might otherwise be caught within the opinion's web, the panel determined that binding *Chevron* deference was not appropriate.

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[5] Though assuming for purposes of its analysis that sufficient delegated authority existed for *Chevron* to be applicable, the panel found significant uncertainty in the actual scope of agency interpretive authority in this case where the lands were no longer public lands, but rather consisted exclusively of Indian and private non-Indian interests (Pet.App. 82a-84a n.22).

Nonetheless, in keeping with *Skidmore*, the panel evaluated the persuasiveness of the 1981 Solicitor's opinion. For a number of reasons, the panel concluded that the 1981 Solicitor's opinion was "arbitrary" and that it lacked the power to persuade, much less to control the panel's final decision (Pet.App. 92a). Specifically, the panel found that the Solicitor had failed to apply the "governing canon" of construction for resolving doubts in land grants (Pet.App. 90a). Having concluded that the 1981 Solicitor's opinion was not only arbitrary, but also in conflict with the general purposes of the Acts, the panel determined that the opinion was not persuasive under *Skidmore*. Thus, the panel reversed the district court's grant of summary judgment against the Tribe on the CBM ownership issue (Pet.App. 94a).

D. The Decision En Banc

The Court of Appeals granted Petitioners' motion for rehearing on the question of whether the term "coal" as used in the 1909 and 1910 Acts "unambiguously excludes or includes CBM." (Pet.App. 8a (footnote omitted)). While supplementing portions of the panel's opinion, the court adopted the panel's analysis as its own. The court specifically found that Petitioners' position in this case could be sustained only by ignoring the entire text of the statutes and by focusing on the single term "coal." (Pet.App. 15a). The opinion noted that a fair review of contemporaneous definitions of "coal" shows that in 1909 and 1910, coal was known to contain "CBM in an occluded state . . . . " (Pet.App. 18a). More technically, "by 1909, scientists understood that gas within coal was a

constituent of coal which was generated by the coalification process." (Pet.App. 19a n.12 (citation omitted)). The court also pointed out that most state courts which had considered the question in the context of private conveyances had also held that "ownership of CBM is in the coal owner." (Pet.App. 23a (citation omitted)). Sustaining the panel's finding of ambiguity and its construction of the Acts, the en banc opinion did not disturb the panel's analysis of the 1981 Solicitor's opinion.

REASONS FOR DENYING THE WRIT

The decision of the Court of Appeals does not warrant review by this Court. First, as a result of recent passage of Pub. L. No. 105-367, 112 Stat. 3313 (1998) ("Enzi Act") (R.App. 6a-8a), Congress has eliminated any potential for national disruption arising from the appeal court's ruling. The case remains one of only local significance. Second, the court's decision reflects an unremarkable application of *Chevron*. After careful scrutiny, the court found the 1981 Solicitor's opinion to be arbitrary and unreasoned. *Chevron* specifically excludes from binding deference those agency statutory interpretations that are impermissible or unreasonable. Third, the statutory text and the purposes of the enactments do not support Petitioners' strained interpretation of the Acts.

I. The Court of Appeals' Decision Does Not Have National Impact Justifying Review by This Court.

In requesting the Court to review this case in its present posture, Petitioners greatly exaggerate the

national significance of the decision below, largely because they underestimate the effect of the Enzi Act on CBM lands outside the Tribe's Reservation. Petitioners also claim that the impact on the parties to the case requires immediate review. But any impact on Petitioners arises only because those parties steadfastly ignored the normal practice in resource development to resolve ownership issues before production. In light of the passage of the Enzi Act and the history of CBM development, Petitioners' admonition that the Court must immediately resolve the ownership issue they have chosen to disregard for nearly two decades does not ring true.

A. The Enzi Act disclaimed federal proprietary interests to CBM and eliminated any need for review.

In response to concerns over the potential effect of the court's CBM ownership decision on federal lands, Congress recently passed the Enzi Act. While the legislation expressly does not apply to land within the Tribe's Reservation at issue in this case, Enzi Act § 1(b)(4), (R.App. 7a), under the Enzi Act, the United States relinquished any claim to CBM on lands patented under the 1909 and 1910 Acts where private leases or contracts authorize CBM development. As stated by the bill's sponsor, Senator Enzi, the legislation will "ensure that existing leases to produce methane . . . remain valid and that there is no future assertion of ownership by the Federal Government on these parcels." 144 CONG. REC. S10595 (daily ed. Sept. 18, 1998). Experience in the Powder River Basin of Wyoming already illustrates the effectiveness of the Enzi Act. *See "WIC Targets Coal-bed Gas With Medicine Bow," Daily Gas Price Index* (Dec. 4, 1998) (announcing $80.5 million pipeline project and stating, "Recent passage of federal legislation clarifying rights to drill for coal-bed methane gas under existing leases cleared the way for significant development of the Powder River Basin . . . .").

Petitioners claim that the exceptions set forth in the Enzi Act hinder its objective of avoiding disruption in CBM development. Petition 25-26. Although no court has yet had an opportunity to interpret the legislation, the exceptions found in the Enzi Act are not as significant as the Petitioners suggest. Where the federal government has already issued a coal lease, the Enzi Act does not resolve the competing claims of federal coal lessees and private CBM lessees. Enzi Act § 1(b)(3), (R.App. 7a). However, one would expect in such instances that, prior to initiating commercial production of CBM, the parties would either have reached a negotiated settlement or have filed a separate lawsuit. Petitioners have not identified even one such case in which a problem actually has arisen. Likewise, although the Enzi Act does not apply where a private CBM contract or lease has not yet been signed, Petitioners have not described a single instance where real and immediate disruption would arise based upon this exception in the legislation. *See* Enzi Act § 1(b)(1), (R.App. 7a). Petitioners' failure to point to any actual controversy stemming from the exceptions in the Enzi Act is telling in light of the fact that the panel's decision on CBM ownership was filed nearly 18 months ago.

Moreover, should disruption actually arise in connection with the limited federal CBM rights preserved by the

Enzi Act exceptions, Congress would in all likelihood address such matters. Senator Enzi has already promised that Congress would "pursue a more in-depth review" next year in order to "work out problems with future leases and with conflicting resource use issues." 144 CONG. REC. S10595 (daily ed. Sept. 18, 1998). As this Court stated last spring, "[t]he capacity of the Legislative Branch to address the issue by comprehensive legislation counsels some caution . . . ." *Kiowa Tribe of Okla. v. Manufacturing Tech., Inc.*, 118 S. Ct. 1700, 1705 (1998). The likelihood of legislative review of the Enzi Act's exceptions weighs against this Court's review of the Court of Appeals' decision, particularly given its interlocutory nature. *See Virginia Military Inst. v. United States*, 508 U.S. 946 (1993) (Scalia, J.) (commenting on general practice of awaiting finality in lower courts).

Even had Congress not passed the Enzi Act, the Court of Appeals' decision would not have resulted in the national disruption that Petitioners struggle to portray. While the court's decision clearly relates only to lands patented under the 1909 and 1910 Acts, Petitioners mistakenly argue to expand its effect to non-coal lands patented under other statutes. This error alone reduces by almost one-fourth the land that Amoco describes as potentially affected by this case. Petition 24 (referencing lands patented under the 1914 Act). Furthermore, CBM development is in its very early stages and remains reasonably isolated. Petitioners acknowledge that only 5% of the coal lands patented under the Acts are subject to private CBM leases. Petition 26. With the exception of the Black Warrior Basin in Alabama, all active CBM development is located in the Tenth Circuit, and more than 85%

of national CBM production is obtained from the San Juan Basin alone. Nonetheless, the mitigating effects of the Enzi Act in those few areas where CBM production is actually occurring on 1909 and 1910 Act lands has simply eliminated any national importance to the Court of Appeals' decision.

Petitioners also fail to recognize that the decision of the Court of Appeals is consistent with the majority rule developed by the highest courts of states in the context of private conveyances.[6] Contrary to the implications of Petitioners' argument, the existence of the majority rule for such conveyances has not interfered with the CBM industry. For example, in the Black Warrior Basin in Alabama, which is the second largest CBM producing basin in the United States, the courts have consistently concluded that the coal owner possesses the right to develop CBM. *Vines v. McKenzie Methane Corp.*, 619 So.2d 1305 (Ala. 1993); *Rayburn v. USX Corp.*, No. CIV. A. 85-G-2661-W, 1987 WL 470907 (N.D. Ala. July 28, 1987). Given the history of development where the majority rule was

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[6] *NCNB Texas Nat'l Bank, N.A. v. West*, 631 So.2d 212 (Ala. 1993) (coal owner owns CBM contained in coal, and gas owner owns CBM which has migrated away from coal reservoir); *Vines v. McKenzie Methane Corp.*, 619 So.2d 1305 (Ala. 1993) (ownership of CBM included in grant of "all coal"); *United States Steel Corp. v. Hoge*, 468 A.2d 1380 (Pa. 1983) (coal owner owns CBM contained in coal); *see also Rayburn v. USX Corp.*, No. CIV. A. 85-G-2661-W, 1987 WL 470907 (N.D. Ala. Jul. 28, 1987) (coal owner is owner of right to explore for and to extract occluded CBM where grantor of deed retained only oil and gas rights). *But c.f. Carbon County v. Union Reserve Coal Co.*, 898 P.2d 680 (Mont. 1995) (right to extract CBM is with holder of gas exploration rights).

applied, Petitioners' suggestion that the Court of Appeals' decision will somehow turn the CBM industry upside down is not plausible.

B. The impact on the parties to the case does not justify interlocutory review of the decision.

Petitioners further assert that the disruption of CBM development on the lands involved in this case warrants review by the Court despite the fact that the case is far from over. During the course of this lawsuit while the Tribe's judicial challenge was pending, CBM development involving the disputed Reservation lands accelerated. Since the lawsuit was filed in 1991, at least 143 wells have been drilled involving lands that are the subject of the dispute. As a result, approximately ten times as much CBM was developed from lands involved in the controversy during the pendency of the lawsuit as in all the years preceding the court case. In fact, throughout the history of this dispute, the Petitioners have consistently refused to slow down their aggressive pursuit of the profits from CBM development in order to address the unresolved ownership issues. Only now, with an unfavorable decision from the Court of Appeals do they find the ownership issues of overwhelming significance requiring the prompt attention of this Court.

Petitioners have also refused to take steps to protect themselves from the adverse consequences of the Court of Appeals' decision. For example, Petitioners complain that the voluntary company suspension of royalty payments to a landowner/lessor in the wake of the decision has created a hardship for some given the reliance on

those payments. On May 8, 1992 – about six months after this case was filed – the Tribe requested an order suspending and escrowing royalty payments. Aplt.App. at 261. Petitioners universally opposed that suggestion, preferring to risk potential liability for improper payments as well as the curtailment of CBM production income in the future. Having convinced the District Court that royalty suspension was unnecessary at the outset of the litigation and long before many of the wells in question were drilled, it is improper for Petitioners to rely on alleged hardships caused by belated royalty suspension as a basis for interlocutory review.

Finally, although none of the governmental entities who are now the subject of Petitioners' concern ever sought to intervene in the litigation, Petitioners suggest that an adverse tax impact on local governments, particularly La Plata County, provides further support for the need to grant review. In making that argument, Petitioners ignore an independently-commissioned analysis that concluded that the impact of the Court of Appeals' decision on the local tax base would be minimal. *The Potential Economic Impacts of the Coal-Bed Methane Dispute in La Plata County, Colorado* 1 (School of Business Admin., Ft. Lewis College 1997) ("Local governments will lose a relatively small part of their property tax bases and also a small percentage of their property tax revenues.").

The Tribe does not deny that this case, like any other case that reaches this Court, is important to the litigants. The Tribe also does not doubt that the ruling of the Court of Appeals causes concern among those who did not anticipate that decision. But those are not reasons for this Court to review this case. Congress has demonstrated

that it is willing to ensure that those who are not parties to the case will be protected from any harsh impact resulting from the Court of Appeals' decision. As to the parties, this case is far from over. The willingness of Petitioners to embark on and escalate CBM development without a resolution of the ownership issue addressed by the Court of Appeals demonstrates the fallacy of their current demand for immediate resolution of the case by this Court in order to avoid adverse impact on the parties.

II. Under the Circumstances of this Case, the 1981 Solicitor's Opinion Was Not Entitled to Binding Deference Under *Chevron*.

Petitioners request the Court to resolve a "mature" and "deep split" in the circuits about how the formality of the process by which agencies interpret statutes affects the deference due such administrative interpretations under *Chevron*. Petition 21-23. For a variety of reasons, this case is not an appropriate vehicle for addressing the format requirements of *Chevron*, even assuming that the Court had not already provided the guidance needed to resolve any question among the circuits. *See, e.g., Metropolitan Stevedore Co. v. Rambo*, 117 S. Ct. 1953, 1963 n.9 (1997); *Smiley v. Citibank (South Dakota), N.A.*, 517 U.S. 735, 741 (1996); *Martin v. Occupational Safety and Health Review Comm'n*, 499 U.S. 144, 157 (1991).

In arguing for review, Petitioners ignore completely the Court of Appeals' holding that the "Solicitor's statutory interpretation of the 1909 and 1910 Acts is arbitrary." (Pet.App. 92a). Clearly under *Chevron*, the court owed no

deference to an administrative interpretation found to be fundamentally unreasoned.[7] Rather, Petitioners imply that the only basis for rejection of the 1981 Solicitor's opinion was the absence of "the 'procedural protections' of notice-and-comment rulemaking" or agency adjudication. Petition 21-22 (quoting Pet.App. 87a). In fact, the court carefully considered the Solicitor's reasoning in holding that the opinion was an impermissible statutory interpretation.[8]

In concluding that the 1981 Solicitor's opinion was entitled to no deference under either *Chevron* or *Skidmore*, the court observed that "[r]easoned decisionmaking does not omit without explanation potentially determinative factors." (Pet.App. 93a). Significantly, the Solicitor's

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[7] The Federal Defendants did not petition for certiorari. They advised the Court of Appeals that the Solicitor had commenced "a review of the analysis" in the 1981 Solicitor's opinion. *Response for the Federal Appellees* at 4 (Feb. 23, 1998). In their own words, "[t]hat review is ongoing and could conceivably result in a modification of the views expressed therein." *Id.*

[8] The Solicitor, though calling attention to the "well-established principle that nothing passes in a public land grant by implication . . . ," found the rule of construction inapplicable because of a perceived absence of ambiguity in Congress' grant of CBM to agricultural entrymen under the Acts (Pet.App. 145a (citing *Leo Sheep Co. v. United States*, 440 U.S. 668, 682-83 (1979)). Had the Solicitor recognized ambiguity under the Acts, his adherence to the cited rule of construction would have dictated a different substantive opinion consistent with that of the Court of Appeals. Ironically, at the same time that Petitioners argue for binding deference under *Chevron*, like the Solicitor, they are forced to deny the very ambiguity in the Acts that would trigger application of the principle for construing public land laws.

views could not be reconciled with the general purposes of the Acts. Ultimately, because of statutory ambiguity on the question before it, the court concluded that the Solicitor's disregard for the canons of construction of federal land grants could not be sustained.

Chevron does not require judicial deference to agency interpretive decisions that are "arbitrary," unreasoned or in conflict with Congress' purposes in enacting the statutes interpreted by the agency, and, this basis for decision by the court below makes consideration of the *Chevron* format question of no consequence to the court's holding. The Court of Appeals' application of *Chevron* to the 1981 Solicitor's opinion falls well within a court's authority to disregard unreasonable statutory interpretations of administrative agencies.

III. The Court of Appeals Correctly Held That Congress Did Not Convey CBM To Agricultural Entrymen Under the 1909 and 1910 Acts.

Petitioners request review of the court's determination that the 1909 and 1910 Acts are ambiguous and its conclusion that Congress reserved CBM under the Acts. Petitioners insist that in reserving "coal" under the Acts, Congress unambiguously conveyed to non-mineral entrymen the CBM located in underground coal deposits. Petition 23-25. After careful statutory analysis, the court found the Acts to be ambiguous, and applying the canon for construing ambiguous public land laws, the court concluded that Petitioners do not own the CBM located in underground coal deposits reserved by Congress in the

Acts. The Court of Appeals' thorough statutory examination does not require review by the Court.

In approaching the Court, Petitioners can point to no statutory language confirming their contention that Congress specifically intended to convey CBM.[9] Rather, Petitioners assert that Congress reserved only the solid parts of coal. Since CBM extracted from coal and brought to the surface is a gas and not a solid, Petitioners argue that Congress clearly did not intend to reserve CBM when it reserved solid coal. The Court of Appeals found that Petitioners' position is obtained only by "focus[ing] solely on the word 'coal' and totally ignor[ing] what is apparent from the face of the statutes . . . ." (Pet.App. 15a). The court observed that the entire statutory language shows that the grants made under the Acts were " 'non-mineral' " grants to lands " 'classified, claimed, or reported as being valuable for coal' " and that the statutory reservation included not just coal, but also " 'the right to prospect for, mine, and remove the same.' " (Pet.App. 15a (citing 1909 Act)).

After extensive review of contemporaneous definitions and descriptions of coal, the court below could not

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[9] Congress did not expressly convey a "natural gas" estate to recipients of limited patents under the Acts. The Acts do not contain the word "gas." The Tribe does not claim ownership of gas located in non-coal strata. Such gas is not part of the coal deposits reserved by Congress, even though it may be excess CBM generated millions of years ago by slowly maturing coal deposits. As the Court of Appeals observed, "[a]t issue here is the ownership of CBM trapped in and produced from the coal reservoir." (Pet.App. 18a n.8).

ignore "[t]he common understanding that coal is a heterogenous, complex substance" and refused to "accept [ ] . . . the limitations defendants . . . promote by their characterization of coal as simply 'the solid rock.' " (Pet.App. 17a). In disputing the court's finding of ambiguity, Petitioners simply hide from view repeated references to coal's gaseous and liquid constituents found throughout contemporaneous dictionary and encyclopedia entries for "coal." *See, e.g.*, IV THE AMERICAN CYCLOPAEDIA: A POPULAR DICTIONARY OF GENERAL KNOWLEDGE 726 (G. Ripley and C. A. Dana, eds. 1883) (describing "coal" as "a compound especially of carbon or of decomposed woody matter, with inflammable substances and hydrogen and oxygen gases.").[10]

The Court of Appeals found Petitioners' arguments inconsistent with the purposes of the grant and the reservation under the Acts. Prior to passage of the 1909 Act,

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[10] The Tribe asserted below and still contends that Congress plainly reserved CBM when it made an in place reservation of "all coal" located in officially designated coal lands. The Tribe steadfastly maintains that detailed examination of the entire texts leaves no reasonable doubt about Congress' unambiguous reservation of CBM under the Acts. *See, e.g., Muscarello v. United States*, 118 S. Ct. 1911, 1919 (1998) ("[M]ost statutes are ambiguous to some degree." (citations omitted)). Textual analysis, together with review of the purposes of the grant and the reservation, removes any doubt or ambiguity as to the Acts' meaning. *See, e.g., Chapman v. United States*, 500 U.S. 453, 463 (1991) (The rule of lenity comes into operation only " 'after a court has seize[d] every thing from which aid can be derived,' [and] it is still 'left with an ambiguous statute.' " (internal quotation omitted) (quoting *United States v. Bass*, 404 U.S. 336, 347 (1971) (quoting *United States v. Fisher*, 6 U.S. (2 Cranch) 358, 386 (1805))).

the nation's public land laws had prohibited agricultural settlement of designated coal lands. This longstanding prohibition, coupled with withdrawals and reclassification of enormous amounts of public land as coal land commencing in 1906, imposed significant hardships upon farmers and ranchers desiring to settle upon the surface of these lands. In the Acts, Congress accommodated the competing mineral resource and agricultural interests through the creation of a coal estate and a non-coal estate. In so doing, Congress had no intention of conveying to agricultural entrymen commercial production rights in underground coal deposits. In fact, upon subsequent disposal of the severed coal estates, the statutes expressly eliminated the sole exception permitting mining by agricultural entrymen of coal deposits for on-site, domestic purposes (initial proviso of 1909 Act (R.App. 1a); initial proviso of 1910 Act § 3 (R.App. 5a)). The new exception promoted by Petitioners, the right to commercial CBM extraction, simply was not and is not remotely associated with the agricultural settlement envisioned by Congress in making the limited grants under the Acts.

Coal mining practices at the turn of the century required ventilation of CBM to avoid the hazards associated with CBM's poisonous and explosive properties (Pet.App. 36a). Consequently, the exercise of dominion and control over CBM was a critical aspect of coal mining. In the absence of any evidence to the contrary, it cannot be assumed that Congress intended to give to agricultural settlers ultimate dominion and control of CBM, a substance that could not be extracted from coal deposits without destroying the coal (Pet.App. 20a-21a).

The Court of Appeals relied not only on Congress' demonstrated awareness and encouragement of technological advances in the use of coal resources, but also upon Congress' use of expansive language to conclude that in reserving "all coal in said lands, and the right to prospect for, mine, and remove the same," Congress' intentions were broad (Pet.App. 29a, 20a n.13), certainly broad enough to include CBM located in underground coal deposits. Having also "found no occasion in which a reservation of a mineral asset to the United States has been treated narrowly to exclude a newly appreciated value associated with that mineral," the court properly resolved any ambiguity on the CBM question in favor of congressional reservation (Pet.App. 31a).

Additionally, Petitioners' statutory interpretation is enormously impractical. *Cf. Burke*, 234 U.S. at 679 (1914) (Congress "was dealing with a practical subject in a practical way . . . ."). Petitioners contend that surface owners own all gases and liquids contained in coal. No party disputes the fact that coal's liquids and gases do not exist in large porous cavities, but rather exist principally within the molecular coal mixture. Instead of using coal deposits as the clear physical boundary of the estates established by these Acts, Petitioners would define the boundaries of their interests based upon the physical state of the molecules in coal after extraction. In contrast to Congress' intentions evidenced by its use of the term "coal deposits," Petitioners would remove any clear, physical demarcation between the coal and non-coal estates. Petitioners, thus, lay claim to any non-solid part of coal that they can force from the "coal deposits" by digging into the coal beds and mechanically altering coal

deposit pressures. Applying Petitioners' ownership theory together with the accommodation doctrine would also permit Petitioners to engage in unbridled *in situ* development of reserved coal, through combustion and distillation, so long as the extracted substance was either gas or liquid. Taken to its logical conclusion, Petitioners' theory would permit them to destroy all of the Tribe's coal. In reserving "all coal in said lands" and the "coal deposits," Congress certainly did not intend such an absurd result.[11]

The Tribe does not take issue with Petitioners' assertion that, under the "rule of accommodation" or some corresponding legal theory of necessity, the Tribe must permit Petitioners to drill through tribal coal to complete

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[11] In 1913, the Bureau of Mines issued a comprehensive study regarding the dangers of oil and gas drilling through coal strata to reach underlying natural gas deposits. George S. Rice, et al., *Oil and Gas Wells Through Workable Coal Beds*, BUREAU OF MINES BULL. 65 (1913). The Bureau of Mines' study included a map of the nation's known coal areas and known oil and gas areas (R.App. 10a). The map depicts a small portion of the nation's vast coal lands as also containing oil and gas; however, the lands at issue in this case are shown as a coal area only. Under Petitioners' theory, the lands at issue in this case and all other coal areas would have been designated as both coal areas and known oil and gas (CBM) areas, and under the Acts, Congress would have specifically intended to convey the natural gas (CBM) to agricultural entrymen. Recognizing even then that all coal contains CBM, the Department officials of the era simply did not regard CBM as natural gas as Petitioners insist, and, despite its exhaustive treatment of potential conflict between coal owners and gas owners, the Bureau of Mines' study nowhere contemplated the clash in rights now fostered by Petitioners' arguments.

wells in underlying natural gas-producing formations. Petition 14; (Pet.App. 47a). Nor is the Court of Appeals' decision at odds with that rule. By the same token, however, because the Petitioners do not own any constituents of the reserved coal deposits, including the CBM trapped in that coal, application of a "rule of accommodation" to permit Petitioners to complete wells in the Tribe's coal for extraction of coal components is nothing more than trespass. The "rule of accommodation" is not a legal device available to Petitioners to aid in taking the property of others.

Similarly, the Tribe does not take issue with application of a common law "rule of capture," which is a "legal rule of non-liability for (1) causing oil or gas to migrate across property lines and (2) producing oil or gas that was originally in place under the land of another, *so long as the producing well does not trespass.*" 8 WILLIAMS & MEYERS, OIL AND GAS LAW, *Rule of Capture* 983 (1996) (emphasis added). The coal deposits themselves clearly demarcate the underground property boundaries at issue in this case. Petitioners may legally complete a well in an adjacent formation with the hope of draining gas trapped within the Tribe's coal. However, because Petitioners do not own the coal deposits, they may not under the "rule of capture" complete wells in the Tribe's coal, fracture or depressurize the coal, and extract CBM from the coal deposit.

While descriptions of coal's "dissolved or occluded" gases in early 1900 have given way to modern explanations of methane sorption, there is no question that CBM fully permeates and is trapped within underground coal. *Compare* VI ENCYCLOPAEDIA BRITANNICA 575 (11th ed. 1910) (quoted by appeals court (Pet.App. 16a-17a)) *with*

Andrew R. Scott, et al., *Thermogenic and Secondary Biogenic Gases, San Juan Basin, Colorado and New Mexico – Implications for Coalbed Gas Producibility*, 78 AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS BULLETIN 1186, 1195 (1994) ("Gases in coal beds are sorbed to the internal structure of coal, which consists of a network of micropores with diameters on the order of nanometers; the density of sorbed methane molecules may approach that of liquid methane."). Amoco's own research scientists, commenting on the unusual bond between CBM and coal's internal surfaces, have observed that "[w]hile some free gas may exist in a coal deposit, the majority of gas is sorbed on the surface of the coal matrix." John P. Seidle and Luis E. Arri (Amoco Prod. Co.), *Use of Conventional Reservoir Models For Coalbed Methane Simulation*, SOCIETY OF PETROLEUM ENGINEERS, Paper No. 21599 at 1 (1990). Contrary to Petitioners' representations to this Court, Petition 7, Amoco's scientists have also concluded that the relationship between coal and CBM readily differentiates coal deposits from conventional gas reservoirs. John P. Seidle (Amoco Tech. Ctr.), *Coalbed Methane: A Unique Resource* (1995).

In sum, the Court of Appeals engaged in an exacting analysis of the Acts. In examining contemporaneous dictionary and encyclopedia entries for the term "coal," references to coal's gaseous constituents were so frequently repeated that the court could not accept Petitioners' narrow meaning for that term. After careful review, the court concluded that the purposes of the Acts, as reflected by their language, historical context and legislative history, were consistent with a reservation of CBM and that a contrary holding would not only be

inconsistent with those purposes, but would also violate the rule for construing public land laws that *"nothing passes except what is conveyed in clear language"* and that "ambiguity or uncertainty in the terms employed [in land grants] should be resolved in favor of the government." (Pet.App. 59a; Pet.App. 11a). Neither the holding of the Court of Appeals nor its statutory analysis in reaching that decision should be reviewed by the Court.

CONCLUSION

For the reasons stated above, the petition should be denied.

Dated December 21, 1998.

Respectfully submitted,

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Act of March 3, 1909, 35 Stat. 844

CHAP. 270. – An Act For the protection of the surface rights of entrymen.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That any person who has in good faith located, selected, or entered under the nonmineral land laws of the United States any lands which subsequently are classified, claimed, or reported as being valuable for coal, may, if he shall so elect, and upon making satisfactory proof of compliance with the laws under which such lands are claimed, receive a patent therefor, which shall contain a reservation to the United States of all coal in said lands, and the right to prospect for, mine, and remove the same. The coal deposits in such lands shall be subject to disposal by the United States in accordance with the provisions of the coal-land laws in force at the time of such disposal, but no person shall enter upon said lands to prospect for, or mine and remove coal therefrom, without previous consent of the owner under such patent, except upon such conditions as to security for and payment of all damages to such owner caused thereby as may be determined by a court of competent jurisdiction: *Provided,* That the owner under such patent shall have the right to mine coal for use on the land for domestic purposes prior to the disposal by the United States of the coal deposit: *Provided further,* That nothing herein contained shall be held to affect or abridge the right of any locator, selector, or entryman to a hearing for the purpose of determining the character of the land located, selected, or entered by

him. Such locator, selector or entryman who has heretofore made or shall hereafter make final proof showing good faith and satisfactory compliance with the law under which his land is claimed shall be entitled to a patent without reservation unless at the time of such final proof and entry it shall be shown that the land is chiefly valuable for coal.

Approved, March 3, 1909.

Act of June 22, 1910, 36 Stat. 583

CHAP. 318. – An Act To provide for agricultural entries on coal lands.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That from and after the passage of this Act unreserved public lands of the United States exclusive of Alaska which have been withdrawn or classified as coal lands, or are valuable for coal, shall be subject to appropriate entry under the homestead laws by actual settlers only, the desert-land law, to selection under section four of the Act approved August eighteenth, eighteen hundred and ninety-four, known as the Carey Act, and to withdrawal under the Act approved June seventeenth, nineteen hundred and two, known as the Reclamation Act, whenever such entry, selection, or withdrawal shall be made with a view of obtaining or passing title, with a reservation to the United States of the coal in such lands and of the right to prospect for, mine, and remove the same. But no desert entry made under the provisions of this Act shall contain more than one hundred and sixty acres, and all homestead entries made hereunder shall be subject to the conditions, as to residence and cultivation, of entries under the Act approved February nineteenth, nineteen hundred and nine entitled "An Act to provide for an enlarged homestead:" *Provided,* That those who have initiated non-mineral entries, selections, or locations in good faith, prior to the passage of this Act, on lands withdrawn or classified as coal lands may perfect the same under th provisions of the laws under which said entries were

made, but shall receive the limited patent provided for in this Act.

SEC. 2. That any person desiring to make entry under the homestead laws or the desert-land law, any State desiring to make selection under section four of the Act of August eighteenth, eighteen hundred and ninety-four, known as the Carey Act, and the Secretary of the Interior in withdrawing under the Reclamation Act lands classified as coal lands, or valuable for coal, with a view of securing or passing title to the same in accordance with the provisions of said Acts, shall state in the application for entry, selection, or notice of withdrawal that the same is made in accordance with and subject to the provisions and reservations of this Act.

SEC. 3. That upon satisfactory proof of full compliance with the provisions of the laws under which entry is made, and of this Act, the entryman shall be entitled to a patent to the land entered by him, which patent shall contain a reservation to the United States of all the coal in the lands so patented, together with the right to prospect for, mine, and remove the same. The coal deposits in such lands shall be subject to disposal by the United States in accordance with the provisions of the coal-land laws in force at the time of such disposal. Any person qualified to acquire coal deposits or the right to mine and remove the coal under the laws of the United States shall have the right, at all times, to enter upon the lands selected, entered, or patented, as provided by this Act, for the purpose of prospecting for coal thereon upon the approval by the Secretary of the Interior of a bond or undertaking to be filed with him as security for the payment of all damages to the crops and improvements

on such lands by reason of such prospecting. Any person who has acquired from the United States the coal deposits in any such land, or the right to mine or remove the same, may reenter and occupy so much of the surface thereof as may be required for all purposes reasonably incident to the mining and removal of the coal therefrom, and mine and remove the coal, upon payment of the damages caused thereby to the owner thereof, or upon giving a good and sufficient bond or undertaking in an action instituted in any competent court to ascertain and fix said damages: *Provided*, That the owner under such limited patent shall have the right to mine coal for use upon the land for domestic purposes at any time prior to the disposal by the United States of the coal deposits: *Provided further*, That nothing herein contained shall be held to deny or abridge the right to present and have prompt consideration of applications to locate, enter, or select, under the land laws of the United States, lands which have been classified as coal lands with a view of disproving such classification and securing a patent without reservation.

Approved, June 22, 1910.

S.2500

One Hundred Fifth Congress
of the
United States of America
AT THE SECOND SESSION

Begun and held at the City of Washington on Tuesday, the twenty-seventh day of January, one thousand nine hundred and ninety-eight

An Act

To protect the sanctity of contracts and leases entered into by surface patent holders with respect to coalbed methane gas.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. PROTECTION OF SANCTITY OF CONTRACTS AND LEASES OF SURFACE PATENT HOLDERS WITH RESPECT TO COALBED METHANE GAS.

(a) IN GENERAL. – Subject to subsection (b), the United States shall recognize as not infringing upon any ownership rights of the United States to coalbed methane any –

(1) contract or lease covering any land that was conveyed by the United States under the Act entitled "An Act for the protection of surface rights of entrymen", approved March 3, 1909 (30 U.S.C. 81), or the Act entitled "An Act to provide for agricultural entries on coal lands", approved June 22, 1910 (30 U.S.C. 83 et seq.), that was –

(A) entered into by a person who has title to said land derived under said Acts, and

(B) that conveys rights to explore for, extract, and sell coalbed methane from said land; or

(2) coalbed methane production from the lands described in subsection (a)(1) by a person who has title to said land and who, on or before the date of enactment of this Act, has filed an application with the State oil and gas regulating agency for a permit to drill an oil and gas well to a completion target located in a coal formation.

(b) APPLICATION. – Subsection (a) –

(1) shall apply only to a valid contract or lease described in subsection (a) that is in effect on the date of enactment of this Act;

(2) shall not otherwise change the terms or conditions of, or affect the rights or obligations of any person under such a contract or lease;

(3) shall apply only to land with respect to which the United States is the owner of coal reserved to the United States in a patent issued under the Act of March 3, 1909 (30 U.S.C. 81), or the Act of June 22, 1910 (30 U.S.C. 83 et seq.), the position of the United States as the owner of the coal not having passed to a third party by deed, patent or other conveyance by the United States;

(4) shall not apply to any interest in coal or land conveyed, restored, or transferred by the United States to a federally recognized Indian tribe, including any conveyance, restoration, or

transfer made pursuant to the Indian Reorganization Act, June 18, 1934 (c. 576, 48 Stat. 984, as amended); the Act of June 28, 1938 (c. 776, 52 Stat. 1209 as implemented by the order of September 14, 1938, 3 Fed. Reg. 1425); and including the area described in section 3 of Public Law 98-290; or any executive order;

(5) shall not be construed to constitute a waiver of any rights of the United States with respect to coalbed methane production that is not subject to subsection (a); and

(6) shall not limit the right of any person who entered into a contract or lease before the date of enactment of this Act, or enters into a contract or lease on or after the date of enactment of this Act, for coal owned by the United States, to mine and remove the coal and to release coalbed methane without liability to any person referred to in subsection (a)(1)(A) or (a)(2).

Speaker of the House of Representatives.

Vice President of the United States and President of the Senate.

Bulletin 65 Petroleum Technology 7

DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

JOSEPH A. HOLMES, DIRECTOR

OIL AND GAS WELLS THROUGH WORKABLE COAL BEDS

PAPERS AND DISCUSSIONS

BY

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AND OTHERS

[SEAL]

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GOVERNMENT PRINTING OFFICE
1913

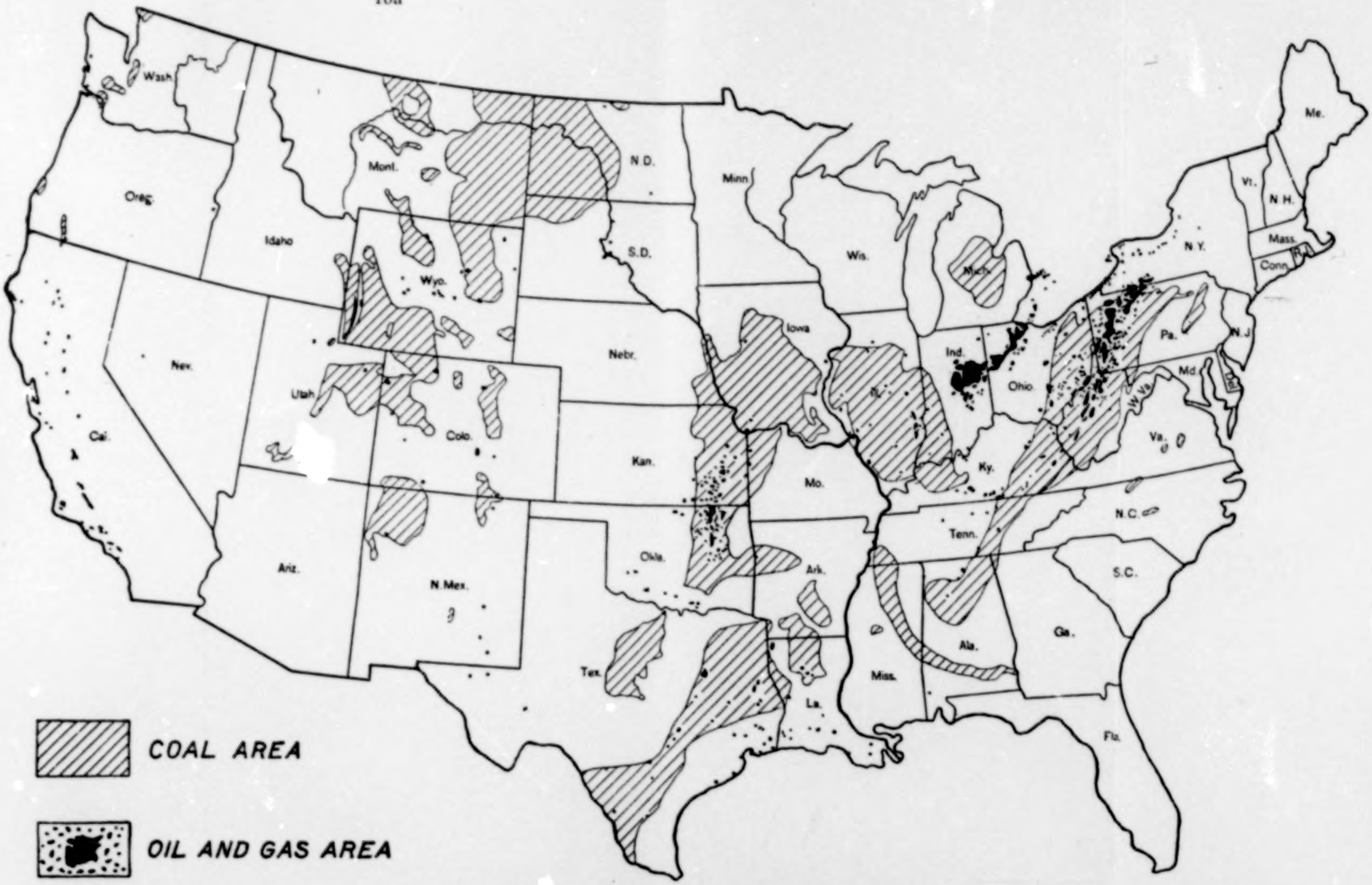

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PLATE 1.—Sketch map of United States, showings area containing coal or lignite and those containing oil or gas.

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No. 98-830

In the Supreme Court of the United States

OCTOBER TERM, 1998

AMOCO PRODUCTION COMPANY, ET AL., PETITIONERS

v.

SOUTHERN UTE INDIAN TRIBE, ET AL.

ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE TENTH CIRCUIT

BRIEF FOR THE FEDERAL RESPONDENTS IN OPPOSITION

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36 pp

QUESTION PRESENTED

Whether Congress's reservation of "coal" in the Coal Lands Act of 1909, ch. 270, 35 Stat. 844, and the Coal Lands Act of 1910, ch. 318, 36 Stat. 583, includes coal bed methane.

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OPINIONS BELOW

The opinion of the en banc court of appeals (Pet. App. 1a-51a) is reported at 151 F.3d 1251. The panel decision of the court of appeals (Pet. App. 52a-94a) is reported at 119 F.3d 816. The opinion of the district court (Pet. App. 95a-132a) is reported at 874 F. Supp. 1142.

JURISDICTION

The judgment of the en banc court of appeals was entered on July 20, 1998. On October 15, 1998, the Chief Justice extended the time for filing a petition for a writ of certiorari to November 18, 1998, and the petition was filed on that date. The jurisdiction of this Court is invoked under 28 U.S.C. 1254(1).

STATEMENT

This case arises from a dispute between the Southern Ute Indian Tribe and petitioners, which include Amoco Production Company and other private entities and individuals, over the ownership of coal bed methane (CBM) that is present within coal seams that underlie the Southern Ute Indian Reservation in Colorado. The Tribe filed suit against petitioners in the United States District Court for the District of Colorado to establish its ownership of that energy resource. The Tribe also sued various federal officials, charging that they had breached their trust responsibilities to protect the Tribe's assets. The district court ruled, on motions for summary judgment, that the Tribe does not own the CBM. Pet. App. 95a-132a. A panel of the United States Court of Appeals for the Tenth Circuit reversed that ruling and remanded the case for further proceedings. *Id.* at 52a-94a. The court of appeals, sitting en banc, reheard the matter and, by a vote of six to three, adhered to the reasoning of the panel decision. *Id.* at 1a-51a. To place this controversy in context, we begin by describing the nature of the physical resource at issue and the statutory bases for the ownership claims. We then turn to the origins and posture of the current controversy.

A. The Physical Resource

The Tribe and petitioners make competing claims to the ownership of CBM that rest, in significant part, on their different characterizations of that energy resource. The Tribe, which indisputably owns the coal underlying its Reservation, contends that CBM is a component of coal. See Southern Ute Br. in Opp. 1, 2-3. Petitioners, who claim a right to drill for natural gas within the reservation, contend that CBM is simply

natural gas that happens to be found in coal deposits. See Pet. 2 & n.1. The scientific literature on coal and CBM provides a useful, but non-dispositive, perspective on those competing characterizations.

1. Coal is essentially fossilized plant material that has undergone a physical and chemical transformation, over millions of years, through the process of accumulation, biological decomposition, and metamorphosis under conditions of high pressure and temperature. See, *e.g.*, C.R. Ward, *Coal Geology*, in 3 *Encyclopedia of Physical Science and Technology* 371 (R.A. Meyers, ed., 2d ed. 1992). Coal is a heterogeneous substance that invariably contains carbonaceous material, moisture, and small amounts of minerals. *Id.* at 372. Because the conditions for coal formation vary, the composition and characteristics of individual coal deposits are not uniform. *Ibid.* For practical purposes, coal users customarily classify coal, based on the ascending degree to which "coalification" has taken place, as lignitic, sub-bituminous, bituminous, and anthracitic. See *id.* at 377, Table I (Coal Classification by the American Society for Testing and Materials). See generally S.L. Bend, *The Origin, Formation and Petrographic Composition of Coal*, 71 J. of Fuel 851, 851-862 (1992) (C.A. App. 664-675).

Bituminous and anthracitic coals generally have the appearance of black rock. Their actual structure, however, is quite complex. See J.W. Larsen & M.L. Gorbaty, *Coal Structure and Reactivity*, in 3 *Encyclopedia of Physical Science and Technology*, *supra*, at 437, 441. At the macroscopic level, coal typically exhibits stratified layers that are themselves composed of microscopic organic composites called macerals (typically vitrinite, liptinite, and inertinite) interspersed with mineral matter. *Id.* at 439-440, 443. The composition of the

macerals depends on the composition of the fossilized organic material (*e.g.*, lignin, waxes, or carbonized wood). *Id.* at 439-440. See generally S.L. Bend, *supra*, 71 J. of Fuel at 862-867 (C.A. App. 675-680).

2. The dispute in this case arises from an unusual physical characteristic of coal: it is extremely porous, containing as much as 20% void volume, and yet is relatively impermeable to passage of gases and liquids. See J.W. Larsen & M.L. Gorbaty, *supra*, at 442-443. The carbonaceous materials within the macerals of bituminous and anthracitic coals typically are "penetrated by an extensive network of very tiny pores and, because of this, have enormous surface areas." *Ibid.* At the same time, the small size of the pores restricts the passage of molecules through the coalbed. "The smaller pores are about the same size as small molecules, so coals are molecular sieves, capable of trapping small molecules in their pores while denying access to larger molecules." *Id.* at 443.[1]

At this molecular level, coal is not a typical crystalline solid. "Coals are believed to be three-dimensionally cross-linked macromolecular networks containing dissolved organic material that can be removed by extraction." J.W. Larsen & M.L. Gorbaty, *supra*, at 444. "The extractable portion of the coal is simply dissolved in this solid, insoluble framework." *Id.* at 445.

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[1] This pore structure differs in several significant respects from that found in "reservoir" rocks that contain hydrocarbon gas and liquids. In the case of coals, the pore structure originated from the same organic material that comprises the contained hydrocarbons, the pore structure is itself composed of hydrocarbons, and the pores are orders of magnitude smaller than those found in reservoir rocks. See J.R. Levine, *Coal Composition, as Related to the Mode of Occurrence of "Coalbed Methane"* 31-32 (Nov. 9, 1992) (C.A. App. 749-750).

"As much as 25% of many coals consists of small molecules that will dissolve in a favorable solvent and can thereby be removed from the insoluble portion." *Id.* at 444. See generally J.R. Levine, *Coal Composition, as Related to the Mode of Occurrence of "Coalbed Methane"* 6-10 (Nov. 9, 1992) (C.A. App. 724-728).

The smallest of the organic molecules present in coal is methane (CH_4). When present in coal beds, it is commonly denominated as coal bed methane (CBM). J.R. Levine, *supra*, C.A. App. 728, 732-733. Like the other organic materials present in coal beds, CBM is a product of the coalification process. *Id.* at 733, 745-748. At standard temperature and pressure, CBM exists as a gas. *Id.* at 733. But when formed in a coal seam, CBM is adsorbed within the pore structure created by the macromolecular matrix. *Ibid.* The CBM, along with other organic molecules, is essentially fixed to the surface of that matrix by inter-molecular electrostatic attractions, known as Van der Waals forces. *Id.* at 728, 740-741.

More so than larger organic molecules within the matrix, CBM can migrate over time, particularly if the coal seam is fractured or if it is subject to changes in temperature and pressure. Those changes alter the equilibrium within the coalbed, counteract the electrostatic forces that fix the CBM in the adsorbed state, and induce the CBM to migrate through the pores and out of the coal's macromolecular structure. See J.R. Levine, *supra*, C.A. App. 733-734, 740-741. Energy companies have developed technology to produce CBM from coal beds through fracturing and creation of pressure or temperature gradients. *Id.* at 733-734. The current controversy centers on whether CBM produced in this manner should be treated, for purposes of the

Coal Lands Act of 1909 and the Coal Lands Act of 1910, as part of the coal or as a separate mineral estate.

B. The Statutory Basis For the Competing Ownership Claims

The competing claims to ownership of CBM arise from two congressional enactments in the early 20th century, the Coal Lands Act of 1909, ch. 270, 35 Stat. 844, and the Coal Lands Act of 1910, ch. 318, 36 Stat. 583. Congress enacted those statutes to allow homesteaders to obtain patents to public lands that the United States believed to be valuable for coal, while reserving the coal itself in federal ownership. The genesis of those statutes is described in *Watt* v. *Western Nuclear, Inc.*, 462 U.S. 36, 47-49 (1983), as well as other sources. See, *e.g.*, R.W. Swenson, *Legal Aspects of Mineral Resources Exploitation*, in P.W. Gates, *History of Public Land Law Development* 699, 724-730 (1968).

1. During the latter half of the 19th century, Congress provided unappropriated public lands for settlement through the Homestead Acts, see, *e.g.*, Act of May 20, 1862, ch. 75, 12 Stat. 392, and the Desert Land Acts, see, *e.g.*, Act of Mar. 3, 1877, ch. 107, 19 Stat. 377 (43 U.S.C. 321-323), which enabled settlers to obtain a land patent by entering and cultivating tracts of prescribed size for a period of years. See P.W. Gates, *supra*, at 387-434. Congress exempted from entry under those Acts, however, public land classified as valuable for coal. *Western Nuclear*, 462 U.S. at 47-48. Coal lands instead could be purchased under the Coal Lands Act of 1864, ch. 205, 13 Stat. 343, and the Coal Lands Act of 1873, ch. 279, 17 Stat. 607 (see 30 U.S.C. 71 *et seq.*). See generally R.W. Swenson, *supra*, at 724-725.

The process of segregating agricultural lands from coal lands proved unsuccessful because coal lands were frequently misclassified as non-mineral lands as a result of mistake or outright fraud. *Western Nuclear*, 462 U.S. at 48 n.9. In 1906, President Theodore Roosevelt withdrew, from all forms of entry, approximately 64 million acres of lands thought to contain coal, "citing the prevalence of land fraud and the need to dispose of coal 'under conditions which would inure to the benefit of the public as a whole.'" *Id.* at 48-49 (quoting 41 Cong. Rec. 2615 (1907)). President Roosevelt later "urged Congress that 'rights to the surface of the public land . . . be separated from rights to forests upon it and to minerals beneath it, and these should be subject to separate disposal.'" *Id.* at 49 (citation omitted). Congress ultimately responded in part by enacting the Coal Lands Act of 1909 and the Coal Lands Act of 1910. *Id.* at 49 & n.10. See R.W. Swenson, *supra*, at 725-729.

The 1909 Act answered the concerns of individuals who had in good faith made agricultural entries onto tracts subsequently withdrawn as coal lands. The Act permitted an entryman to receive a patent to his tract, but the patent contained a reservation to the United States "of all coal in said lands, and the right to prospect for, mine, and remove the same." 35 Stat. 844 (currently codified at 30 U.S.C. 81). The 1910 Act opened the remaining coal lands for entry under the homestead laws, allowing "actual settlers," upon proof of compliance with the homestead laws, to receive patents to those lands. As in the case of the 1909 Act, the patents contained a reservation to the United States "of all the coal in the lands so patented, together with the right to prospect for, mine, and remove the same." 36 Stat. 584 (currently codified at 30 U.S.C. 83-85).

2. The lands opened for settlement under the 1909 and 1910 Acts included lands within the Southern Ute Indian Reservation in Colorado. In 1880, the members of the Southern Ute Indian Tribe agreed to sell a large portion of their land within the Reservation to the United States, excepting certain allotted lands "provided for their settlement." Act of June 15, 1880, ch. 223, 21 Stat. 200. Congress directed that the ceded, unallotted reservation lands be treated as public lands, and it opened those lands to entry for non-Indian settlement under the homestead laws. See 21 Stat. 203-204. See generally *United States* v. *Southern Ute Tribe*, 402 U.S. 159, 162-164 (1971). The ceded territory included lands that President Roosevelt later withdrew from entry and that Congress made available for patenting under the 1909 and 1910 Acts.

In 1938, under the authority of the Indian Reorganization Act of 1934, ch. 576, 48 Stat. 984 (25 U.S.C. 461 *et seq.*), the United States restored to the Tribe, in trust, title in the ceded reservation lands (including reserved coal) that had not been disposed of to settlers. Pet. App. 109a. As a result of that restoration, the Southern Ute Indian now has equitable title to tribal lands within its Reservation and the coal estate beneath lands within the Reservation that were settled by non-Indians under the 1909 and 1910 Acts. Petitioners, by contrast, either own the non-coal portions of the lands conveyed under the 1909 and 1910 Acts or hold mineral leases from those owners limited to the non-coal portions of those lands. *Id.* at 109a-110a. See La Plata County Amicus Br. 16a (map of Southern Ute Indian Reservation).

C. The Current Controversy

The energy shortages of the 1970s prompted investigation into alternative fuel sources, including the possibility of producing CBM from coalbeds. Questions arose, however, over who owned the CBM if the owner of the fee had severed, by sale or reservation, a coal estate or a gas estate from the remainder of the fee. Those issues could arise under federal law with respect to lands patented under the 1909 and 1910 Acts, which reserved all "coal" to the United States, as well as lands patented under the Agricultural Entry Act of 1914, 30 U.S.C. 121 *et seq.*, which reserved "gas" to the United States. Similar questions of federal law could also arise under the Mineral Leasing Act of 1920, 30 U.S.C. 181 *et seq.*, which establishes separate procedures for leasing coal and for leasing oil and gas. See 30 U.S.C. 221, 226. CBM ownership issues could also arise on other lands governed by state law, by virtue of an individual owner's decision to lease or reserve coal or gas. See, *e.g.*, S.K. Farnell, *Methane Gas Ownership: A Proposed Solution for Alabama*, 33 Ala. L. Rev. 521 (1982).[2]

1. In 1981, the Solicitor of the Interior issued an opinion entitled "Ownership of and Right to Extract Coalbed Gas in Federal Coal Deposits," M-36935, 88 Interior Dec. 538 (May 12, 1981) (Pet. App. 140a-159a). The Solicitor concluded: (1) the 1909 and 1910 Acts did not reserve the coal bed gas found in the reserved coal; (2) the reservation of gas under the Agricultural Entry

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[2] See also, *e.g.*, E.A. Craig and M.S. Myers, *Ownership of Methane Gas in Coalbeds*, 24 Rocky Mt. Min. L. Inst. 767 (1978); P.C. McGinley, *Legal Problems Relating to Ownership of Gas Found in Coal Deposits*, 80 W. Va. L. Rev. 369 (1978); R.K. Olson, *Coalbed Methane: Legal Considerations Affecting Its Development As An Energy Resource*, 13 Tulsa L.J. 377 (1978).

Act did include coal bed gas; and (3) coal bed gas is disposable under the oil and gas leasing provisions of the Mineral Leasing Act. See Pet. App. 143a. The Solicitor cautioned, however, that "nothing in this opinion warrants title to any oil and gas deposit." *Id.* at 159a.

2. Ten years later, on December 31, 1991, the Tribe filed this action against petitioners and others who asserted a right to CBM derived from the Tribe's coal. The Tribe sought a declaration that it is the sole owner of the CBM, and it sought damages for the alleged trespass and conversion of the Tribe's property. The Tribe also sued the United States, seeking a declaration that the United States owed a duty to the Tribe to protect and manage CBM development for the Tribe on lands covered by the 1909 and 1910 Acts.[3]

Petitioners responded that the reservation of "all coal" in the 1909 and 1910 Acts did not include CBM, and they also raised other affirmative defenses. The United States concurred in petitioners' interpretation of the two Acts, relying on the 1981 Solicitor's opinion, and additionally asserted that the Tribe's breach of trust claim against the United States was barred by the applicable six-year statute of limitations, 28 U.S.C. 2401(a), in light of the Tribe's past history of CBM development and its knowledge of the Solicitor's 1981 opinion.

3. The district court ruled on cross-motions for summary judgment that "Congress did not reserve CBM gas in the United States in the Coal Lands Acts of

[3] The Tribe also filed suit against the United States in what is now the United States Court of Federal Claims, alleging that the United States had breached its trust obligation to protect the Tribe's interest in property with respect to development of the CBM. See U.S. C.A. Br. 26 n.7.

1909 and 1910 and, consequently, [the Tribe's] claim of equitable ownership to CBM gas in the lands at issue fails." Pet. App. 98a. The court concluded, on the basis of dictionary definitions that describe coal as a "solid" or "rock," that the 1909 and 1910 Acts do not include CBM. *Id.* at 110a-116a. The court also concluded that the legislative history of those Acts, which made no reference to CBM, supported that interpretation. *Id.* at 116a-127a. The court additionally stated that the 1981 Solicitor's opinion was entitled to deference under *Chevron U.S.A. Inc.* v. *Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984). Pet. App. 128a-130a. At the same time, the district court rejected the Tribe's invocation of the principle that doubts regarding the interpretation of statutes be resolved in favor of the Indians. The court found that principle inapplicable because the 1909 and 1910 Acts are public land laws, not laws passed for the benefit of Indians. *Id.* at 127a. Finally, the district court declined to address affirmative defenses, including the United States' assertion that the action was barred by the applicable statute of limitations. See *id.* at 130a-131a.

4. The court of appeals reversed the district court's judgment and remanded for further proceedings. Pet. App. 52a-94a. The court of appeals reasoned that the question of CBM ownership "cannot be disposed of by the simple tautology that gas is gas," *id.* at 63a-64a, because Congress could have reasonably viewed adsorbed CBM as "an integral part of the coal," *id.* at 64a. The court concluded that the 1909 and 1910 Acts did not manifest a specific intent to convey CBM, *id.* at 66a, and, by contrast, that those Acts did manifest a general intent to reserve the federal government's entire economic interest in the coal deposits, *id.* at 71a-72a. Those considerations, "coupled with the principle of

statutory construction that resolves ambiguity in favor of the sovereign," see, *e.g.*, *Western Nuclear*, 462 U.S. at 59, persuaded the court that "CBM was reserved to the United States." Pet. App. 72a. The court of appeals also rejected the district court's conclusion that the 1981 Solicitor's opinion was entitled to *Chevron* deference, reasoning that "*Chevron* deference is owed only to legislative rules and agency adjudications." *Id.* at 85a. The court of appeals remanded the case for further proceedings to resolve, among other questions, whether the Tribe's challenge is barred by the statute of limitations. *Id.* at 94a & n.27.

5. Petitioners sought rehearing en banc, and the en banc court granted rehearing limited to the question "whether the term 'coal' as used in the 1909 and 1910 coal lands statutes unambiguously excludes or includes coalbed gas." By a vote of six to three, the en banc court adhered to, and supplemented, the reasoning of the unanimous panel. Pet. App. 1a-51a; see *id.* at 8a-9a. The en banc court specifically held that the term "'coal' as used in the Coal Lands Acts of 1909 and 1910 neither unambiguously includes nor excludes coal bed methane. Given the established principle that all doubts respecting land grants and mineral reservations are construed in favor of the government, *see Watt v. Western Nuclear, Inc.*, 462 U.S. at 59, * * * coal reserved to the United States in the 1909 and 1910 Acts includes the adsorbed CBM." *Id.* at 32a-33a.

In reaching the conclusion that the 1909 and 1910 Acts are ambiguous, the en banc court surveyed the text of those Acts, Pet. App. 11a-14a, contextual indicia of Congress's specific intent, *id.* at 14a-24a, and indicia of Congress's general intent drawn from the legislative history and related statutes, *id.* at 24a-32a. The en banc court expressly declined to reconsider the panel's

decision that the 1981 Solicitor's opinion was not entitled to *Chevron* deference. *Id.* at 9a-10a. It also noted that "[o]ur reversal will require the district court to address the defenses asserted by defendants to preclude recovery by the Tribe, at least some of which appear to raise issues of serious magnitude." *Id.* at 33a n.19. Three judges dissented, reasoning that "coal was not understood, either in 1909 or today, to include a gas." *Id.* at 34a; see *id.* at 34a-51a.[4]

ARGUMENT

The United States submits that the petition for a writ of certiorari should be denied. First, the decision below satisfies none of the usual criteria that this Court applies in determining whether to exercise its certiorari jurisdiction—the issue is novel, there is no conflict among the courts of appeals regarding the interpretation of the relevant federal statutes, and the case is in an interlocutory posture. Moreover, Congress has taken action in response to the court of appeals' decision, and it now appears that the decision will directly and immediately affect only the parties to this particular litigation. Congress is in a better position than this Court to address any indirect effects over the long term. Finally, the court of appeals' decisions in this

[4] The United States did not petition for rehearing en banc. It filed a supplemental brief explaining that it had previously endorsed petitioners' arguments on the basis of the 1981 Solicitor's opinion and not merely on the basis that the question of CBM ownership should be resolved by reference to the dictionary meaning of the term "coal." See Pet. App. 9a n.2. The United States additionally explained that, in light of the panel's decision, the Solicitor of the Interior had commenced a review of the analysis set out in the 1981 Solicitor's opinion and that the review could conceivably result in modification of the views expressed therein. *Ibid.*

case have prompted the Solicitor of the Interior to reconsider the analysis set forth in the 1981 Solicitor's opinion, and he has withdrawn that opinion. See Add. 1a. Accordingly, this case no longer involves the issue of *Chevron* deference that petitioners raise in the question presented.

A. This Case Does Not Satisfy The Court's Criteria For Certiorari

Petitioners contend that certiorari is warranted here because "the court of appeals fundamentally misinterpreted major public lands statutes" (Pet. 16-21), because its decision manifests "a deep split in the circuits" respecting *Chevron* deference (Pet. 21-23), and because the issue presents an "important national question" that "must be resolved now" (Pet. 23-28). The United States, which has elected not to seek certiorari in this case, does not share petitioners' view. To the contrary, this case lacks the normal prerequisites for obtaining certiorari on a question of statutory construction. We first discuss those threshold considerations and then turn to petitioners' specific arguments in support of certiorari.

1. This Court does not normally grant certiorari in cases involving questions of statutory construction in the absence of a square conflict among the courts of appeals on the meaning of the federal statute involved. See Sup. Ct. R. 10. No such conflict exists here. The court of appeals' decision in this case addresses a novel issue of statutory interpretation under two public land laws that are nearly a century old. No other federal court—much less another federal court of appeals—has addressed the question of whether the Coal Land Acts of 1909 and 1910 reserved CBM in federal ownership. Furthermore, we are not aware of any pending litigation raising that issue. Thus, there is no need for this Court to grant certiorari to secure uniformity among the decisions of the courts of appeals. See R.L. Stern et al., *Supreme Court Practice* 168 (7th ed. 1993). Indeed, the grant of certiorari on a novel issue in the absence of a conflict would deprive the Court of the benefit of a fully ventilated discussion of the issue among the courts of appeals.[5]

The decision below is not only one of first impression that has generated no conflict among the circuits, but it is also interlocutory. This Court "generally await[s] final judgment in the lower courts before exercising [its] certiorari jurisdiction," even where the court of appeals has resolved the merits of the case and only the "determination of an appropriate remedy" remains. *Virginia Military Inst.* v. *United States*, 508 U.S. 946 (1993) (opinion of Scalia, J., respecting the denial of the petition for writ of certiorari); see also, *e.g.*, *Brotherhood of Locomotive Firemen & Enginemen* v. *Bangor & Aroostook R.R.*, 389 U.S. 327, 328 (1967)(per curiam)

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[5] To be sure, in appropriate circumstances, the United States has asked this Court to address important public land issues in the absence of a circuit conflict. See *Western Nuclear*, 462 U.S. at 42 & n.4; but see *id.* at 72-73 (Stevens, J., dissenting) (suggesting that certiorari should have been denied); *Watt* v. *Alaska*, 451 U.S. 259, 274 & n.2 (1981) (Stevens, J., concurring) (same). The United States, however, is circumspect in seeking review in the absence of a circuit conflict, particularly in light of the fact that this Court recently denied a government petition presenting a public land issue that the United States deems important and that *had* generated a circuit conflict. See *United States* v. *Koch*, 516 U.S. 915 (1995) (denial of certiorari involving public lands issue affecting ownership of 11,000 unsurveyed islands). In this case, the United States was entitled to file a petition for certiorari seeking review of the judgment of the court of appeals, but has decided not to do so for the reasons articulated in this brief.

(denying certiorari "because the Court of Appeals remanded the case," making it "not yet ripe for review by this Court"); see also R.L. Stern et al., *supra*, at 197 (in the absence of an "unusual factor, the interlocutory nature of a lower court judgment will result in a denial of certiorari").

In this instance, the case is not interlocutory in a merely technical sense. To the contrary, in remanding the case, the en banc court of appeals stated that "[o]ur reversal will require the district court to address the defenses asserted by defendants to preclude recovery by the Tribe, at least some of which appear to raise issues of serious magnitude." Pet. App. 33a n.19. If it is determined that those defenses preclude the Tribe from obtaining relief, that determination will effectively moot the dispute between the Tribe and the other parties over ownership of CBM and preclude the need for this Court's review.[6]

2. Given the absence of a conflict among the circuits, the interlocutory nature of the court of appeals' decision, and the absence of other pending litigation, petitioners face a heavy burden in establishing the need for

[6] For example, the United States has raised a statute of limitations defense in response to the Tribe's breach of trust claims. See Pet. App. 131a; see also 28 U.S.C. 2401(a) (establishing a six-year limitation period). As the United States explained at length in its court of appeals brief, the record developed below reveals that the Tribe did not file its suit until more than six years after the Tribe and its lawyers knew of and acknowledged receipt of the 1981 Solicitor's opinion, knew that CBM was being extracted on non-tribal fee lands pursuant to private oil and gas leases, and knew that the Department of the Interior had approved communitization agreements pooling tribal and fee lands. See U.S. C.A. Br. 14-26, 30-43.

this Court's review. The three proffered bases fall short of the mark.

a. Petitioners first argue that certiorari is warranted because the court of appeals "fundamentally misinterpreted major public lands statutes." Pet. 16-21. Petitioners' assertions that the court below misconstrued the statutes at issue—which are no more "major" than many other public land laws—does not provide an adequate basis for this Court's review. "Most certainly, this Court does not sit primarily to correct what we perceive to be mistakes committed by other tribunals." *Alaska*, 451 U.S. at 275 (Stevens, J., concurring). To the extent that the correctness of the decision below bears on whether this Court should grant review, the question that the court of appeals addressed is far closer—and its answer more formidable—than petitioners portray.

Petitioners argue that the reservation of coal could not include CBM because dictionaries describe coal as a "solid" and "[c]ommon sense dictates" that coal cannot include CBM (Pet. 16 & n.6). The dictionary definitions, however, are not particularly enlightening because they primarily describe the appearance—rather than the composition—of "coal." See Pet. 16 n.6; compare *Western Nuclear*, 462 U.S. at 42-43 (dictionary definitions of "mineral" unhelpful). And petitioners' invocation of "common sense" simply begs the question. The en banc court of appeals is not alone in rejecting those arguments as unconvincing. Three of the four state-court decisions that have addressed CBM ownership have held, as a matter of state law, that a grant or reservation of "coal" can include CBM.[7]

[7] See *NCNB Texas Nat'l Bank, N.A.* v. *West*, 631 So. 2d 212 (Ala. 1993) (adsorbed CBM is part of coal estate); *Vines* v.

As we pointed out in our supplemental brief on rehearing en banc, the question of CBM ownership should not be resolved by facile references to dictionary definitions of the term "coal." Pet. App. 9a n.2. The court of appeals in this case looked beyond dictionary definitions and analyzed the whole statutory language (*id.* at 11a-14a), its context (*id.* at 14a-24a), the legislative history (*id.* at 24a-30a), and related statutes (*id.* at 30a-31a). The court ultimately concluded that the 1909 and 1910 Acts are ambiguous on the precise matter at issue here (*id.* at 32a). The court of appeals' mode of analysis was the same as that employed by both the majority and the dissent in *Western Nuclear*. See 462 U.S. at 42-60; *id.* at 60-72 (Powell, J., dissenting).

There is accordingly no merit to petitioners' hyperbole that the court "breach[ed] the most fundamental tenets of statutory construction" (Pet. 17) or engaged in "result-oriented" analysis (Pet. 18 n.7). To the contrary, the court of appeals' decisions raised serious questions that have prompted the Solicitor of the Interior to reevaluate the 1981 Solicitor's opinion--a matter that we discuss at pages 25-28, *infra*. The important point for present purposes is that the court of appeals' decision exhibits no "fundamental" flaws that would warrant this Court to take the extraordinary step of granting certiorari to review an interlocutory decision addressing a novel statutory issue that does not give rise to any circuit conflict.

McKenzie Methane Corp., 619 So. 2d 1305 (Ala. 1993) (grant of "all coal" included coalbed methane); *United States Steel Corp.* v. *Hoge*, 468 A.2d 1380 (Pa. 1983) (right to "drill through coal" for gas did not include right to recover adsorbed CBM). But see *Carbon County* v. *Union Reserve Coal Co.*, 271 Mont. 459 (1995) (grant of "all coal and coal rights" did not include CBM).

b. Petitioners' contention that this Court should grant review to "resolve a deep split" among the courts of appeals respecting application of the *Chevron* doctrine (Pet. 21-23) is also without merit. This Court has refined the *Chevron* doctrine in the course of resolving statutory issues that independently warrant this Court's review. The Court does not typically grant certiorari, in a case that does not otherwise justify review, simply to review a court's application of *Chevron* principles. Compare, *e.g.*, *Atlantic Mut. Ins. Co.* v. *Commissioner*, 118 S. Ct. 1413, 1417, 1418 (1998); *Smiley* v. *Citibank (South Dakota), N.A.*, 116 S. Ct. 1730, 1732 (1996); *Reno* v. *Koray*, 515 U.S. 50, 54, 60-61 (1995).

In any event, this case would not provide an appropriate instance for reviewing the question whether *Chevron* deference is owed to agency interpretations that are not embodied in legislative rules or adjudications. As a general matter, we agree with petitioners that an agency is entitled to *Chevron* deference whenever the agency, in the course of exercising authority assigned to it by Congress, adopts a reasonable interpretation of an ambiguous statute. Pet. 22. See *Pension Benefit Guar. Corp.* v. *LTV Corp.*, 496 U.S. 633, 647-652 (1990); *Martin* v. *Occupational Safety & Health Review Comm'n*, 499 U.S. 144, 156-157 (1991). In this case, however, the Court would first need to resolve the serious antecedent question of whether Congress has assigned authority to the Department of the Interior to make post-conveyance determinations that are entitled to deference in disputes with other parties regarding the scope of the statutory reservations set out in the 1909 and 1910 Acts. See Pet. App. 82a-84a & n.22.

The *Chevron* doctrine comes into play only if Congress "left ambiguity in a statute *meant for implementation by an agency*." *Smiley*, 116 S. Ct. at 1733 (em-

phasis added). See *Metropolitan Stevedore Co.* v. *Rambo*, 117 S. Ct. 1953, 1963 n.9 (1997). That matter did not receive adequate attention below. The court of appeals did not resolve it, Pet. App. 82a, and this Court would need to decide that issue before it could reach the *Chevron* issue that petitioners contend warrants this Court's review. Moreover, the Solicitor's decision to withdraw the 1981 Solicitor's opinion (see pp. 25-28, *infra*) has now mooted the question of whether that opinion is entitled to *Chevron* deference. See *Estate of Cowart* v. *Nicklos Drilling Co.*, 505 U.S. 469, 480 (1992). Given those circumstances and the fact that *Chevron* questions regularly recur, the Court should await a more appropriate case in which to address the *Chevron* issue petitioners pose.[8]

c. Petitioners and their amici also contend that this case involves an "important national question" that "must be resolved now to avoid industry disruption and profound uncertainty and hardship." Pet. 23-28. The United States disagrees with that assessment and with the notion that the Court's review of the specific issue in this particular case (which would not resolve questions of CBM ownership under state law) could provide the "national" or industry-wide certainty they contend is needed.

As noted above, this case is one of first impression, and we are not aware of any other pending litigation on the question of whether the 1909 and 1910 Acts reserve

[8] The district court correctly rejected the Tribe's argument that any ambiguity in the 1909 and 1910 Acts should be resolved in favor of the Indians in this case. As the district court pointed out (Pet. App. 127a), the Acts are public land laws, not statutes passed for the special benefit of Indians. That fact that the coal reserved by the United States in this case was conveyed to an Indian Tribe therefo e has no bearing on the applicable legal analysis.

CBM as part of the coal estate. Because the Tenth Circuit is the first court of appeals to address the question, its ruling has actually diminished long-standing uncertainty respecting ownership of CBM. Before petitioners began their commercial CBM ventures, legal commentators had repeatedly expressed the widely recognized understanding that CBM development posed novel legal issues respecting ownership of the resource. See note 2, *supra*. And prior to the court of appeals' ruling in this case, two of the three state supreme courts that had addressed CBM ownership had ruled that the owner of the coal estate owned CBM under state law. See note 7, *supra*. The court of appeals has decided the issue in accord with the current majority rule in the state courts. That decision has clarified the law; it simply has not clarified the law in the way that petitioners would have preferred.

Petitioners' claims (Pet. 23) of "industry disruption and profound uncertainty and hardship" are exaggerated. The current level of CBM development is quite small and is concentrated primarily in the Tenth Circuit. See Southern Ute Br. in Opp. 16-17. Although petitioners contend that this case affects more than 16 million acres of potential coal land (Pet. 24 & n.13), only a small fraction of that land is likely to contain economically recoverable CBM, and only a small fraction of the current landowners would be affected. Indeed, petitioners concede that, in 1994, even after Congress had provided temporary tax incentives for CBM production, see 26 U.S.C. 29, there were only 6300 producing CBM wells in the entire Nation. Pet. 25.[9]

[9] By comparison, in 1992, more than 280,000 natural gas wells were in production nationwide. See National Petroleum Council, U.S. Dep't of Energy, *Marginal Wells* 39 (1994). The distribution

Furthermore, this case appears to present a unique situation under the 1909 and 1910 Acts. The Department of the Interior has informed us that its research has failed to identify any non-federal entity, other than the Southern Ute Indian Tribe, that has succeeded to the United States' reservation of coal under those Acts. Because the coal reserved by the 1909 and 1910 Acts remains almost exclusively in federal hands, Congress, which can take prospective action and grant retrospective relief, remains best situated to address any questions of "national importance" respecting ownership of CBM. Cf. *Kiowa Tribe* v. *Manufacturing Tech., Inc.*, 118 S. Ct. 1700, 1705 (1998) ("The capacity of the Legislative Branch to address the issue by comprehensive legislation counsels some caution.").

Indeed, Congress has addressed such issues in the past and has demonstrated its capacity to tailor a legislative response that is appropriate to the circumstances presented. For example, in 1955, Congress took action to settle disputes over the removal of "source material" from coal lands. See Uraniferous Lignite Act, 30 U.S.C.

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of the CBM wells is also significant. The largest number of CBM wells (2,706) were located in Alabama, where the Alabama Supreme Court has ruled that the coal estate owner also owns the CBM (see note 7, *supra*). See S.H. Stevens et al., *Technology Spurs Growth of U.S. Coalbed Methane*, 94 Oil & Gas J. 56 (Jan. 1, 1996) (1996 WL 8286296, at Table 4). See also *id.* at *4 ("Development in the Warrior basin slowed markedly following the end of the tax credits, with just 79 new CBM wells added during 1994."). Most of the remaining wells (2,514) were located in the San Juan Basin (including the lands involved here) and would be governed by the Tenth Circuit's analogous rule. See *id.* at Table 4. See also *id.* at *3 ("The San Juan basin dominates the industry, accounting for 82% of total CBM production in 1994 * * *, but new well completions dropped to one third of 1992 levels as the basin matured with just over 2,500 producing wells.").

541-541i. More recently, Congress has taken steps to clarify ownership issues respecting CBM. It created a framework, under the Energy Policy Act of 1992, Pub. L. No. 102-486, § 1339, 106 Stat. 2986, to assist States in resolving CBM ownership issues. See 42 U.S.C. 13368. And, in direct response to this litigation, Congress enacted the Enzi Act, Pub. L. No. 105-367, 112 Stat. 3313, to address CBM ownership issues under the 1909 and 1910 Acts. See Southern Ute Br. in Opp. 6a-8a.

Congress enacted the Enzi Act to ameliorate hardships that could result as a consequence of the court of appeals' decision. That Act disclaims any infringement on the United States' ownership rights to CBM in those situations in which a patentholder under the 1909 Act or the 1910 Act had leased CBM or applied for a permit to drill a gas well to a completion target located in a coal formation. See § 1(a)(1) and (2), 112 Stat. 3313-3314. Hence, patentholders, other than the parties to this litigation, who have commenced CBM leasing and drilling activities on those lands will not be affected by the court of appeals' decision.[10] In the face of congressional action, this Court need not rush to act in response to their concerns. Compare *Alaska*, 451 U.S. at 265 n.8 (because of congressional inaction, "we are left to resolve by judicial construction what should be

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[10] The Enzi Act exempts from its coverage "any interest in coal or land conveyed, restored, or transferred by the United States to a federally recognized Indian tribe." § 1(b)(4), 112 Stat. 3314. As we have noted in the text (see p. 22, *supra*), however, the Interior Department has not identified any other Indian Tribe (or any other non-federal entity) to which coal reserved under the 1909 or 1910 Act was transferred.

addressed as a question of legislative policy judgment").[11]

At bottom, the court of appeals' decision will have a direct and immediate effect only on the parties to this litigation. In considering petitioners' claims of "significant financial hardship" (Pet. 27), the Court should bear two factors in mind. First, at the time petitioners commenced development of CBM, there was considerable, well-publicized uncertainty respecting title to CBM, see note 2, *supra*. The 1981 Solicitor's opinion articulated the Interior Department's judgment on the matter, but it also expressly made clear that "nothing in this opinion warrants title to any oil and gas deposit." Pet. App. 159a; see also *id.* at 80a n.20. In the face of the outstanding uncertainty, petitioners elected to go forward with CBM production from potentially disputed lands without taking steps to resolve the title issues and (insofar as appears) without taking steps to insure against the known risks of an adverse title judgment. Compare J.L. Lewin, *Coalbed Methane: Recent Court Decisions Leave Ownership "Up in the Air," But New Federal and State Legislation Should Facilitate Production*, 96 W. Va. L. Rev. 631, 648 (1994) ("CBM development usually requires a negotiated compromise among gas owners and coal owners, and a 50-50 split is not an uncommon arrangement."). Second, this case remains in an interlocutory posture, and until the district court resolves the outstanding defenses, the question of liability remains open. Petitioners' contentions of "hardship" do not provide a basis for departure from the Court's normal practice of declining review of interlocutory decisions, particularly where the proceedings on remand may eliminate the dispute and the alleged hardship.

[11] Petitioners and their amici contend that the Enzi Act provides only "limited relief" because it does not, for example, protect CBM lessees from claims by coal lessees (Pet. 25 n.15), and it does not guarantee patentholders who have not undertaken CBM development that they will receive title to CBM (Pet. 26-27). Congress is entitled, however, to make a judgment that the relief granted is sufficient to meet the current needs of the patentholders and to revisit unresolved issues at a later date. See 144 Cong. Rec. S10,595 (daily ed. Sept. 18, 1998) (statement of Senator Enzi that Congress could "pursue a more in-depth review" in the future in order to "work out problems with future leases and with conflicting resource use issues"). Moreover, a decision of this Court, which could decide only the disputed issues in this case, would not necessarily resolve those issues or other speculative questions respecting CBM ownership.

B. The Solicitor Of The Interior Has Withdrawn the 1981 Solicitor's Opinion

The 1981 Solicitor's opinion expressed the Interior Department's judgment respecting ownership of CBM under the 1909 and 1910 Acts. The legal conclusion expressed therein was reasonable at the time it was rendered. Nevertheless, as this Court has made clear, "[a]n initial agency interpretation is not instantly carved in stone." *Chevron*, 467 U.S. at 863. To fulfill its executive responsibility, an agency "must consider varying interpretations and the wisdom of its policy on a continuing basis." *Id.* at 863-864. That principle applies to legal interpretations. An agency must be willing to reassess its past opinions in light of new judicial decisions and the insights gained in the course of litigation. See, *e.g.*, *Nicklos Drilling Co.*, 505 U.S. at 476. Here, the Solicitor of the Interior has reassessed the 1981 Solicitor's opinion in light of the court of appeals' panel and en banc decisions. On the basis of that reassessment, he has concluded that the analysis contained therein now appears inadequate in certain

key respects in the light of those decisions. The Solicitor has therefore concluded that the opinion should be withdrawn. See Add. 1a.

1. The 1981 Solicitor's opinion evaluated the 1909 and 1910 Acts on the basis of a relatively simple analysis that, in retrospect, did not fully appreciate the complexities of the issue. The opinion first drew a sharp dichotomy, based on contemporary dictionaries and publications, between CBM—which it characterized as a "gas"—and coal—which it characterized as a "solid, brittle, more or less distinctly stratified, combustible carbonaceous rock." Pet. App. 143a-144a & n.9. It then described the enactment of the 1909 and 1910 Acts, noting the "well-established principle that nothing passes in a public land grant by implication" but also observing that public land grants "are not to be so construed as to defeat the intent of the legislature." *Id.* at 145a (quotation marks and citation omitted).

The 1981 Solicitor's opinion next stated that the Acts did not enunciate an "affirmative Congressional policy" respecting "the disposition or ownership of coalbed gas," but concluded that "it is apparent from the legislative history" that "Congress was aware of the narrow scope of the proposed reservation of 'coal.'" Pet. App. 146a. It relied on two floor statements of a single congressman that the Acts reserved "only the coal, and not other minerals." *Id.* at 146a-147a. The opinion also identified two subsequently enacted statutes—the Uraniferous Lignite Act and 30 U.S.C. 124—and inferred, from passages in the legislative reports supporting their enactment, a congressional understanding that a federal reservation of one mineral did not reserve other minerals that occurred in close association. Pet. App. 147a-149a. The opinion also noted that a Pennsylvania

trial court had concluded "that coalbed gas was not conveyed in a grant of 'coal.'" *Id.* at 150a.

2. Viewed in light of current perspectives on statutory construction and the court of appeals' opinions below, the 1981 Solicitor's opinion no longer provides an adequate analysis of the issue presented here. As this Court recently stated, "[t]he plainness or ambiguity of statutory language is determined by reference to the language itself, the specific context in which the language is used, and the broader context of the statute as a whole." *Robinson* v. *Shell Oil Co.*, 117 S. Ct. 843, 846 (1997). The 1981 Solicitor's opinion—unlike the court of appeals' en banc decision (see Pet. App. 11a-14a, 14a-24a, 24a-32a)—did not analyze the issue in that way.

The 1981 opinion's textual analysis was limited to a single word—"coal." The opinion relied on a contemporary dictionary—which primarily described the appearance, rather than the composition, of the substance—to conclude that "coal" and CBM are necessarily distinct substances. The opinion did not take into account existing knowledge about the origins, structure, and composition of coal (see pp. 3-5, *supra*) or, more importantly, what Congress in 1909 and 1910 would have understood about those matters. See Pet. App. 14a-18a. In addition, the 1981 opinion did not analyze the text in light of the overarching purposes of the 1909 and 1910 Acts. See *Western Nuclear*, 462 U.S. at 46-56. Compare Pet. App. 18a-21a.[12]

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[12] For example, the 1981 opinion did not consider that, at the time of the reservation, the agricultural patentee had no use for (or means of extracting) CBM, while the United States could not remove the reserved coal without also removing the adsorbed CBM. It seems unlikely that Congress intended to give the agricultural patentee a useless commodity that would necessarily

The 1981 opinion's heavy reliance on legislative history, in place of textual analysis, was also problematic. As the court of appeals noted, "legislative history should be treated cautiously." Pet. App. 28a (citation omitted). In this case, the cited legislative history is relatively sparse, indirect, and inconclusive on the core question of whether the reservation of coal includes adsorbed CBM. See *id.* at 28a-29a, 31a & n.18. The 1981 opinion's reliance on the opinion of the Pennsylvania trial court decision now also presents problems, because the Pennsylvania Supreme Court reversed that ruling, *United States Steel Corp.* v. *Hoge*, 468 A.2d 1380 (1983), and other state courts have concluded that the owner of the coal estate also owns the CBM. See Pet. App. 21a-24a; note 7, *supra*.

3. For the foregoing reasons, the Solicitor of the Interior has determined that the court of appeals' en banc decision presents a more thorough and persuasive analysis of the issue presented here than the 1981 Solicitor's opinion, and he has therefore withdrawn the 1981 Solicitor's opinion. The United States accordingly will no longer rely upon it in this case or in any future litigation. The Department of the Interior will continue to work with Congress to evaluate whether additional legislation is appropriate to address any future questions respecting CBM ownership.

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be dissipated when the coal owner removed the coal. It might be possible to infer that Congress expected that the courts would clear up the matter by devising federal common-law rules that would excuse a taking of the patentee's CBM, or require the payment of compensation for its waste. But the simpler inference here may be the better one – *viz.*, Congress reserved CBM as an integral part of the coal estate.

CONCLUSION

The petition for a writ of certiorari should be denied.

Respectfully submitted.

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JANUARY 1999

ADDENDUM

[Seal Omitted]

UNITED STATES DEPARTMENT OF INTERIOR

OFFICE OF THE SOLICITOR
Washington, D.C. 20240

January 4, 1999

To: Secretary

From: Solicitor

Re: Withdrawal of Previous Solicitor's Opinion Addressing Ownership of and Right to Extract Coalbed Gas in Federal Coal Deposits

The May 12, 1981 Opinion of the Solicitor on this subject (#M-36935) is hereby withdrawn.

FILED
JAN 7 1999
OFFICE OF THE CLERK

No. 98-830

IN THE
Supreme Court of the United States
OCTOBER TERM, 1998

AMOCO PRODUCTION COMPANY, on behalf of itself and the class it represents,*
Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,
Respondent.

On Petition for a Writ of Certiorari to the United States Court of Appeals for the Tenth Circuit

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REPLY BRIEF OF PETITIONERS

As numerous *amici curiae* attest, including the five States primarily affected by the decision below, resolution of who owns coalbed gas in lands patented under the Coal Land Acts of 1909 and 1910, 30 U.S.C. §§ 81, 83-85 ("1909 and 1910 Acts"), is critical to the future of an important and growing national industry, as well as to the financial welfare of thousands of landowners and industry stakeholders. No arguments in the briefs in opposition detract from the national significance of this case or justify the decision of the Tenth Circuit.

Indeed, the only revelation in the briefs is the extraordinary step that the Department of Interior, intent on preserving at all costs a ruling in favor of the Southern Ute Tribe ("Tribe"), has taken in an attempt to short-circuit this Court's review: namely, the issuance, on the date the brief of the United States was due, of a one-sentence order withdrawing a binding opinion of the Solicitor of Interior of 17 years' standing on which the coalbed gas industry was built. U.S. Br. App. 1a.

This was an opinion adopted after a thorough analysis of the statutory language, context, and history that was intended to encourage the development of a desperately needed energy source in the wake of the energy crisis in the late 1970s. It succeeded remarkably, and billions of dollars have been invested in reliance on that opinion. Interior now declares: "never mind," in an action without parallel in the Department's long history. In an age of cynicism, it is difficult to imagine a more blatantly political and cynical act than Interior's one-line order. Petitioners, many of whom are individuals of modest means who have had royalty payments withheld since the panel decision below and are suffering immediate and real harm from the government's breathtaking reversal of position, urge the Court not to permit the federal government successfully to engage in gamesmanship in manipulating this Court's docket. If the federal government really believes that the 1909 Congress meant to reserve

gas when it reserved coal, then let the issue be briefed and decided by this Court on the merits now.

I. Respondents contend that petitioners exaggerate the impact of the decision below. Tribe Br. 13-14; U.S. Br. 21. But the Court need not rely solely on the parties' representations to judge the importance of this case. Five States encompassing almost 90% of lands with coal reservations under the 1909 and 1910 Acts urge this Court to grant a writ of certiorari . They emphasize the economic dislocation, hardship to individual citizens, and tax impacts that flowed directly from the Tenth Circuit's judgment.[1] Counties where the consequences are the most dire also support immediate review by this Court. Moreover, *amici curiae* from across the coalbed gas industry—representing producers, pipelines, and landowners—uniformly attest to the industry disruption and uncertainty that the Tenth Circuit's decision has generated outside the lands contested in this case, notwithstanding passage of the Enzi Act.[2]

Predictably, the respondents vaguely suggest, without serious analysis, that the Enzi Act removes the need for immediate review by this Court. To the -contrary, the Act's proponents repeatedly emphasized its limited protection and the need for Supreme Court review of the Tenth Circuit's decision. See, *e.g.*, Cong. Rec. H10,937 (daily ed. Oct. 15, 1998) (remarks of Rep. Cubin) ("we

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1 *See Public Lands Statistics* 54-55 (1997) (state-by-state breakdown of land patents). These same States also contain the majority of the 4.35 million acres of land where oil and gas alone were reserved to the United States under the Act of July 17, 1914, 30 U.S.C. §§ 121-123. *See Public Lands Statistics*, at 54-55. Not only are 1914 Act lands properly considered, *see* Pet. 24 n.13, but, if anything, petitioner's estimate of 20 million affected acres may be too low. *See* Brief of *Amici Curiae* The Coalbed Methane Ad Hoc Committee *et al.* 2-3 ("Independent Producers Br."). Although the five *amici* States are the primary ones affected, 1909 and 1910 Act patents reserving coal have been issued for lands in 17 States, belying the Tribe's claim that this decision has only "local significance," Tribe Br. 13. *See Public Lands Statistics*, at 54.

2 Pub. L. No. 105-367, 112 Stat. 3313 (1998).

expect the United States Supreme Court will grant a writ of certiorari and decide the ownership question"); see also *id.* H10,938-39 (remarks of Reps. McInnis and Rahall). In any event, respondents' blindered focus on the impact of the Tenth Circuit decision on "[t]he current level of CBM development" (*i.e.*, existing wells), U.S. Br. 21, simply misses the point.

The major adverse effect of the Tenth Circuit's decision, undisputed by respondents, is that title to coalbed gas worth billions of dollars is now uncertain in 20 million acres of land in 17 States. Such widespread impairment of the alienability of property is intolerable in any circumstance, but it is especially pernicious in an industry founded on marketable title. See Mountain States Producers Br. 4. In particular, title uncertainty will retard the development of the coalbed gas industry in the 95% of 1909 and 1910 Act lands that are unleased. Cf. Tribe Br. 16 (acknowledging that only 5% of lands are subject to lease). Respondents' dismissal of the importance of unleased lands simply ignores the recent, dramatic changes of the coalbed gas industry.

Historically, the received wisdom was that coalbed gas was commercially recoverable only from "deep coalbeds," Pet. App. 142a; it was assumed that high pressure was necessary to keep sufficient quantities of gas from dissipating from the reservoir. Recently, independent producers in the Powder River Basin in Wyoming began prospecting for gas in shallow coalbeds for lack of any profitable alternatives. They struck paydirt; wells began producing gas in unexpectedly large quantities. A leasing frenzy ensued. See Louise Klee, *Market Watch: Powder River Pipeline Plans Proceed Even As Court Ruling Slows Drilling*, Inside F.E.R.C.'s Gas Market Report, Sep. 18, 1998, *available in* 1998 WL 10043286. As a result, 2250 wells have been drilled or permitted in Campbell County, Wyoming alone in the last three years. Independent Producers Br. 3.

Because of the Powder River Basin experience, the industry is actively exploring future coalbed gas "plays" in

lands never previously thought valuable. Cf. Bureau of Land Management, U.S. Dep't of Interior, 1 *Final Environmental Impact Statement, Record of Decision: Price Coalbed Methane Project* 1-1 (1997) (nearly 1000 prospective wells in the Uintah Basin in Utah). Development typically occurs rapidly if a "play" is discovered. But if title is uncertain, producers risk being held liable in trespass or conversion for all production, and earning no return on substantial upfront capital investment in wells and processing, gathering, and transportation facilities. Producers will either forgo the opportunity, or incur the deadweight cost of entering into expensive protective arrangements with both the coal and the gas owners. The Tribe calls for substantiation of this self-evident point, see Tribe Br. 15, but the Court has all the proof it needs in the numerous *amicus* briefs submitted in support of this petition. The industry participants who will conduct new exploration, production, and transportation of coalbed gas have represented to the Court that title uncertainty created by the decision below has interfered with and will restrict their development activity significantly.

The Court should act now to eliminate the unnecessary and costly legal risk that the Tenth Circuit injected into coalbed gas development.[3] There is no need to await a circuit split. First, it would be detrimental to the industry

[3] The Tribe argues that the Tenth Circuit's decision did not alter the legal landscape because it was consistent with a purported "majority rule" (*i.e.*, two of three state supreme courts) in cases deciding coalbed methane rights under certain private deeds. Tribe Br. 17 & n.6. Those cases turn on the deed language and state-law rules of deed construction, affect only the plots of land at issue, and have no bearing on the meaning of Congress' reservation of "coal" in the 1909 and 1910 Acts (as even the panel below admitted). Pet. App. 48a n.3. The only rule for 1909 and 1910 Act lands, in Alabama and elsewhere, was that established by the 1981 Solicitor's opinion: namely, that coalbed gas belonged to the patentee. Nor are any unresolved issues of state law, U.S. Br. 20, an impediment to coalbed gas development. That industry flourished in the wake of the Solicitor's opinion in 1981 without any apparent obstacles posed by state law. *See* Pet. 24-25.

to leave the ownership of gas unsettled for the years it would take another case to travel to this Court. Not only are the direct effects of the Tenth Circuit decision severe (because many of the major coal basins with known coalbed gas reserves are in that Circuit), but producers must account for the legal risk of title uncertainty in every State with 1909, 1910, or 1914 Act lands. Second, deferring consideration will yield little gain to this Court's review. The legal positions on each side have fully crystallized, and there are five legal opinions for the Court to draw upon (the 1981 Solicitor of Interior, the district court, the panel, the *en banc* majority, and the *en banc* dissenters). In addition, the importance of the issue ensures that the matter will be briefed not only by the parties, but also by numerous *amici*. Thus, the legal issue will be thoroughly vetted before the Court will decide it.

Indeed, the United States acknowedges that "in appropriate circumstances, [it] has asked this Court to address important public land issues in the absence of a circuit conflict." U.S. Br. 15 n.5. It declines to say what the "appropriate circumstances" were in those cases that are absent here. The United States does not dispute that this case involves far more valuable minerals than were at issue in *Watt* v. *Western Nuclear, Inc.*, 462 U.S. 36 (1983). See Pet. 23-24. Moreover, *Watt* v. *Alaska*, 451 U.S. 259 (1981), did not even involve title, but simply the statutory division of mineral leasing revenues. Contrary to respondents' claims, legislation will not resolve the question of title to coalbed gas. Even if Congress were to award title to the owner of the coal estate, the question of pre-existing title in the patentee would simply arise again in the form of takings claims. The fact that the United States may be the primary owner of still severed coal estates in 1909 and 1910 Act lands, U.S. Br. 22, also does not make curative legislation likely. Congress has already declined to relinquish to landowners any possible ownership claims to coalbed gas reserves worth billions of dollars in unleased lands. See Pub. L. No. 105-367, § (1)(b)(5).

Nor should review be delayed pending trial on the merits of the various equitable defenses petitioners have asserted. The critical and dispositive issue for review—the meaning of the reservation of "coal" in the 1909 and 1910 Acts—is strictly legal in nature and has been finally decided. Moreover, this case is many years away from final judgment. Not only must there first be resolution of the defenses "common" to all petitioners, but there will follow protracted discovery and trial on the *individual* defenses of the approximately 3,000 class members.

In addition, neither respondent even bothers to address the nationwide uncertainty created by the ruling below as to entitlement to federal tax credits for those with an economic interest in development of coalbed gas. See Pet. 27-28. Taxpayers—including royalty owners, producers, and investors in financial trusts—simply will not know the status of those credits. The silence of the United States on a major issue of federal tax liability is deafening.

Finally, even respondents cannot diminish the financial hardship to the almost 3,000 farmers and ranchers who have been deprived of the millions of dollars of needed royalty income escrowed in the wake of the decision below. Instead, the Tribe tries to pin the blame on Amoco and other producers, arguing illogically that royalties should have been escrowed earlier (thereby exacerbating the hardship). See Tribe Br. 18-19.[4]

The United States also faults petitioners, curiously relying on a statement in the 1981 Solicitor's opinion that it was not a warranty of title. U.S. Br. 24 (citing Pet. App. 159a). This states the obvious: no patentee has a

[4] Production on the reservation has also been adversely affected; Amoco alone has suspended investment projects that would have raised production by 20% by the year 2000. The Tribe's contrary claims are misleading; the 143 wells were drilled in 1992 largely because that was the last year that federal tax credits were available. As to the tenfold production increase, that owes almost entirely to the hundreds of wells drilled *prior* to the lawsuit, which entered peak production phases after early dewatering periods. *Cf.* La Plata County Br. App. 15a.

cause of action against the United States as grantor for breach of title warranty, see *Black's Law Dictionary* 1588 (6th ed. 1990), but that does not alter the fact that the 1981 opinion was issued to "resolve . . . who owns the coalbed gas in land where the coal or oil and gas was reserved to the United States." Pet. App. 142a. The United States further suggests that petitioners should have negotiated a 50-50 split of royalties between the gas and coal owners. See U.S. Br. 25. It is astonishing to fault property owners who do not surrender 50% of their wealth to foreclose any possible third party claim. This suggestion also ignores that the express purpose of the 1981 Solicitor's opinion was to "expedite development of this energy source" by resolving the title question that had "hindered any decision on how, and under what right of extraction, it can be developed." Pet. App. 142a.[5] The United States cannot escape the fact that the Department of Interior invited reliance on its 1981 opinion it now disavows. Indeed, it is ironic that the United States discounts petitioners' reliance, given that the Enzi Act was designed to preserve the very same reliance interests of others. See S. Rep. No. 105-408, at 2 (1998). The decision below has unsettled ownership of extremely valuable minerals and thwarted legitimate reliance interests, thus causing turmoil in the industry and hardship to individuals. This Court's review is unquestionably warranted.

II. The United States never explains its complete about-face in this litigation. On appeal, the United States "adopt[ed] Amoco Production Company's brief" in full on the meaning of the 1909 and 1910 Acts. Br. for Federal Appellees, No. 94-1579, 28 (May 19, 1995). Although the United States stated to the court of appeals *en banc*

[5] The Tribe's insinuation that the Solicitor issued the 1981 opinion in collusion with Amoco, Tribe Br. 5-6, is irresponsible, and not supported by the United States. First, the issue of coalbed gas ownership was before the Solicitor by virtue of an application of another producer. C.A. App. 2029-30. Amoco filed a lawsuit against the Department to compel administrative action after inordinate delay because it had 38 leases that were about to expire by operation of law. *See* C.A. App. 638, 2051, 2055, 2059.

that its prior views rested on the 1981 Solicitor's opinion, see Pet. App. 8a n.2; in fact, it had originally defended the district court's opinion based on "the plain meaning of 'coal,' the legislative history of the relevant Acts and their historical context, and finally, [] the 1981 Solicitor's Opinion to which the [district] court accorded deference under *Chevron U.S.A. Inc.* v. *Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984)." Federal Appellees Br. 28.

Not only has the United States abandoned the position taken below, but the Department of Interior has now withdrawn the 1981 Solicitor's opinion. The claim that the Department did so after legitimate reconsideration, U.S. Br. 25-26, is belied by the fact that the current Solicitor did not issue a contrary opinion in the 18 months since the panel decision was handed down, but instead issued a one-sentence retraction order on the date the brief of the United States was due in this Court. The withdrawal order is a transparent attempt to remove the *Chevron* issue from this case because the issue plainly was decided incorrectly below and warrants review for the reasons stated in the petition.[6]

The United States ties itself in knots trying to justify Interior's change of position. It assures the Court that the 1981 opinion "was reasonable at the time it was rendered," U.S. Br. 25, but not now in light of "current perspectives on statutory construction" and the opinion below, *id.* at 27. Petitioners are unaware of any sea change in statutory construction in the last 17 years, and the

[6] The assertion, U.S. Br. 19, that *Chevron* may not apply to post-conveyance determinations of title by Interior is unfounded. This Court long ago ruled that Interior is vested with "the control of all matters affecting the disposition of the public lands of the United States, and the adjustment of private claims to them under the legislation of Congress," precisely to ensure certainty of title. *Barden* v. *Northern Pac. R.R. Co.*, 154 U.S. 288, 326 (1894). The additional suggestion that the Court does not grant certiorari merely to review "application of *Chevron* principles" curiously overlooks *United States* v. *Haggar Apparel Company*, No. 97-2044.

critique by the United States of the 1981 opinion in light of the decision of the court of appeals is unpersuasive.

The United States wrongly attacks the 1981 opinion for supposedly focusing on the word "coal" and certain legislative colloquies without considering " 'the broader context of the statute as a whole.' " U.S. Br. 27 (quoting *Robinson* v. *Shell Oil Co.*, 117 S. Ct. 843, 846 (1997)). First, the word "coal" is the operative statutory language that identifies the mineral reserved to the United States; because Congress did not refer to natural gas found in coal formations in 1909, such gas belongs to the patentee.[7] Second, the charge is untrue, for the 1981 opinion examined not only the word "coal" and the legislative debates, but discussed at length the character of the minerals at issue, the entire historical context of the coal lands crisis resolved by the 1909 and 1910 Acts, and the progression of statutes dealing with mineral reservations and leasing. See Pet. App. 143a-52a.

The United States next takes the 1981 opinion to task for relying on a Pennsylvania trial court decision that was overruled. However, the Department of Interior, in an as yet unretracted 1990 Solicitor's opinion, subsequently declared that case irrelevant because it is based on Pennsylvania's unique geology and "stratum theory" of minerals

[7] The petition exposes the Tenth Circuit's misreading of contemporaneous texts that it claims suggest that coal was partly gas, *see* Pet. 18 n.7, and neither respondent answers that analysis. The Tribe instead contends there are "repeated references" to gaseous constituents of coal, but its lone example does not support its claim. Tribe Br. 24 (quoting IV *The American Cyclopaedia: A Popular Dictionary of General Knowledge* 726 (G. Ripley & C. Dana eds., 1883)). This source is not referring to hydrogen or oxygen found in a gaseous state in coal reservoirs; rather it is referring to the presence of hydrogen and oxygen in the atomic structure of *solid* coal. *See* IV *Cyclopaedia* at 726, 737-38. The Tribe also conveniently omits the fact that the entry begins by defining "coal" as a solid. *Id.* at 726. In addition, the Tribe's attempt to rely on the statutory reference to coal "deposits" does not support its analysis. *See Andrus* v. *Shell Oil Co.*, 446 U.S. 657, 658 n.1 (1980).

ownership that is inapplicable to federal lands. Pet. App. 169a-71a.

Finally, the United States criticizes the 1981 opinion for failing to analyze congressional understanding of the scientific "origins, structure, and composition of coal" in 1909 and 1910. U.S. Br. 27. That criticism runs afoul of this Court's admonition that a "strictly scientific" definition of a mineral "is not the test contemplated by the statute," and that words identifying minerals should be given "their ordinary and popular sense." *Burke* v. *Southern Pac. R.R. Co.*, 234 U.S. 669, 679 (1914). In any case, not only is there nothing unique about the state of natural gas in coal (as the Solicitor of Interior concluded in his 1990 opinion), Pet. App. 165a, but also it is fanciful to think that the state of gas *in situ* in coal reservoirs had any effect on Congress in 1909 or 1910. See Horace C. Porter & F. K. Ovitz, *The Escape of Gas From Coal* 3 (1911) (Dep't of Interior, Bureau of Mines Technical Paper) ("little is known as to the condition of [methane] gas in the coal"). As set forth in the petition, Pet. 16-21, it is the court of appeals ruling, and not the 1981 Solicitor's opinion, that is an indefensible interpretation of the 1909 and 1910 Acts.

CONCLUSION

The petition for a writ of certiorari should be granted.

Respectfully submitted,

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(4)

Supreme Court, U.S.
FILED
DEC 22 1998
OFFICE OF THE CLERK

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1998

AMOCO PRODUCTION COMPANY,
on behalf of itself and the class it represents,
Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,
Respondent.

Petition for a Writ of Certiorari to the United States Court of Appeals for the Tenth Circuit

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AMICUS BRIEF OF LA PLATA COUNTY, COLORADO IN SUPPORT OF PETITION FOR CERTIORARI

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33 pp

QUESTION PRESENTED

Whether, in reserving to the United States "coal" in lands patented under the 1909 and 1910 Coal Land Acts, 30 U.S.C. § 81, 83-85, while passing the surface land and all other minerals (including natural gas) to the patentee, Congress reserved only the solid rock fuel commonly known as "coal," but not natural gas in coal formations, as the Department of Interior determined in a formal Solicitor's opinion entitled to judicial deference under *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984).

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STATEMENT OF INTEREST OF AMICUS CURIAE, LA PLATA COUNTY, COLORADO

Historical Background

La Plata County is located in the southwest corner of Colorado; its southern boundary is the state of New Mexico. The city of Durango, established in 1881 as the County seat, is less than 60 miles from the four corners of New Mexico, Utah, Arizona and Colorado (App. 1a, Vicinity Map of La Plata County, Colorado).

La Plata County and the State of Colorado were created from lands ceded to the United States by Mexico in 1848 (App. 2a, 3a, La Plata County Budget). The current Reservation of the Southern Ute Tribe (Tribe), was created from these lands, although what is presently known as the Tribe was legally established in 1880.

Previous to that, in 1862, Congress authorized the grant of public land for what we would today call infrastructure: roads, canals and railroads to facilitate western expansion. Congress also encouraged settlement of the surface lands by those who were willing to homestead 160 acres. *See* Homestead Act, § 12 Stat. 392, 93 (1862). Development of the vast federal coals located in the West was fostered by the enactment of additional federal statutes, first in 1864, and again in 1873. *See* Act of July 1, 1864, ch. 205, 13 Stat. 343; Act of March 3, 1873, ch. 279, 17 Stat. 607. Thus, when Colorado became a state in 1876, the rights of homesteaders and mineral owners were already in place. Four years later in 1880, the respondent Tribe was legally established. *See United States v. Southern Ute Tribe*, 402 U.S. 159, 161-165 (1971).

Fifty-eight years after the Tribe was legally established, it received the coal conveyed by the Department of Interior. *Southern Ute Indian Tribe v. Amoco Prod. Co.*, 151 F.3d 1251 (10th Cir.

1998). The 10th Circuit has now held that this coal includes the methane gas. *Id.*

The Tribe and the County

The Tribe, a Sovereign Nation, is predominately located within the boundaries of La Plata County, Colorado, with the balance located in adjoining Archuleta County (App. 1a, Vicinity Map of La Plata County, Colorado). As of 1997, the total County population, including Tribal members, was 40,939 (App. 7a, La Plata County Population). The Tribe consists of 1305 members (App. 4a, Tribal Enrollment) with 895 living within the Reservation boundaries and the balance of 410 living elsewhere. More than seven times as many non-tribal members as Tribal members live within the Reservation boundaries, a total land area which consists of 1,058.6 square miles (App. 5a, 6a American Indian Reservations and Trust Lands). Thus, the Southern Ute Reservation has a current population of 7,804 with 6,099 of those Reservation inhabitants being non-tribal members. Yet, all the mineral resources at issue are located within the Tribal Reservation boundaries.

Due to the various federal statutory enactments, the present day Reservation is a checkerboard of Tribal and non-tribal (fee) ownership both on the surface and the sub-surface. Thus, the Tribe owns approximately one-half of the surface lands within the Reservation (App. 9a, Southern Ute Indian Tribe Surface Ownership within the Indian Reservation). The balance of the property within the Reservation is owned by non-tribal citizens, many of whom trace their origins to the original homestead families who still farm and ranch in this area. Nonetheless, that portion of the County which is the Southern Ute Indian Reservation is still the least settled or least densely populated area of the County (App. 2a, 1998 La Plata County Budget).

Given its origins as federal land as well as the existence of the Southern Ute Tribal Reservation, a small tract of the Ute

Mountain Ute Reservation, National Forest, Bureau of Land Management and a small portion of land owned by the State of Colorado, La Plata County has thousands of acres, almost one-half of the entire county, which are exempt from taxation. (App. 8a, Non-Taxable Land of La Plata County). The effect of the 10th Circuit decision is to take more property off the tax rolls of the County, the school districts and the special districts. Because so much of the County is already tax exempt, the impact of more exemptions magnifies the loss of revenue.

While minerals in the West are severable from the surface, a review of the title to the minerals located within the Reservation also produces a checkerboard array (App. 13a, Fruitland Coalbed Methane Development as of April 9, 1998, Ignacio Blanco Field Southern Ute Indian Reservation Prepared by Southern Ute Department of Energy). Focusing just on the type of gas at issue in this case, coalbed methane ("CBM"), the Tribe's own documents show they already own a substantial majority of CBM located within the Reservation (Pink legend = Tribal coal/Tribal oil & gas). Conversely, the gas at issue in this case (Green legend = Tribal coal/fee oil & gas) which will become Tribal property if the Tenth Circuit decision is final, would combine Tribal ownership with coal and coalbed methane within the Reservation to upwards of 80%. This map also demonstrates that because neighboring Archuleta County has a much smaller portion of the CBM at issue, La Plata County will face the bulk of the financial impact of the Tenth Circuit decision.

Oil and Gas Development in the County

The earliest known drilling for oil and gas in the San Juan Basin field which is partially located in La Plata County was in 1921, eighteen years before the coal reserves were conveyed to the Tribe by Department of Interior. *James E. Fassett, Geology and Coal-Bed Methane Resources of the Northern San Juan Basin, Colorado and New Mexico* (1988). The first genuine oil and gas "boom" in this County was in the 1950's. (App. 3a, 1998 La Plata County Budget). Oil and gas development plays an increasingly

significant role in La Plata County's economy. (App. 3a, The 1998 La Plata County Budget at its present value is 561.7 million dollars, almost 50% of all La Plata County valuation (App. 10a, Total Valuation: La Plata County, Colorado 1988-1998).

Solicitor's Opinion and Tax Incentives:

In 1981, when the Solicitor's opinion was issued, "*Ownership of And Right to Extract Coalbed Gas in Federal Coal Deposits*, 88 Interior Dec. 538 (1981), another oil and gas boom ensued. Drilling activity was accelerated not only due to the Solicitor's opinion, but also, as a result of the enactment by Congress of legislation designed to induce exploration of alternative or non-conventional energy sources. 26 U.S.C. § 29(A)(C)(1). This tax credit applied both to the producers as well as the mineral owners as Congress was encouraging landowners to lease coalbed gas and also encouraging oil companies to drill for it.

Among the purposes of the tax credit was the encouragement of the development of coalbed methane. *See generally, S. Rep. No.* 394, 96 Cong. 1st Sess. 87 (1979). As originally drafted, the tax credit incentive was to expire before 1990, however, it was extended for one year. *Technical and Miscellaneous Revenue Act of 1988*, § 6302, amending 26 U.S.C. 29(f)(1)(a). Expiration of the tax credit for CBM culminated in extensive drilling in 1990, the last year of the tax credit (App. 12a, La Plata County Drilling Permits and Production Values).

***Ad Valorum* Taxation**

Assessment and taxation of real and personal property is a creature of the Colorado Constitution. *Colo. Const.* Art. X, § 3. Uniquely, Colorado has a constitutional requirement (the *Gallagher Amendment*) that taxation of residential property cannot exceed a fixed amount of 21%, while all other property, including oil and gas property, is assessed at 29% of actual value. *Id.*, § 3(b). Consequently, a removal of oil and gas production in La Plata

County, Colorado, can have a greater negative financial revenue impact as compared to those counties which rely upon a smaller percentage of oil and gas tax revenue.

In La Plata County, *ad valorum* taxation supports three (3) school districts (including the Ignacio School District which the vast majority of Tribal children attend), all special districts located within the Reservation (including fire protection for the Tribe and its natural resources), and the County.

Today, La Plata County has a valuation of oil and gas of 561.7 million dollars, which is twice the valuation of our entire residential properties (App. 10a, Total Valuation: La Plata County, Colorado). The majority of this highly valued oil and gas is located within the Reservation and much of it is the coal bed methane at issue.

Tribal Exemption

Tribal properties located within the confines of the Reservation, held in trust, are exempt from taxation. 25 U.S.C. § 465, "Protection of Indians in Conservation of Resources." From a local government perspective, this is the single most important fact which justifies certiorari because the revenue supported entities, the schools, the County and all special districts, will lose substantial revenue if the Tribe owns the CBM at issue.

Economic Impact of the Decision

For purpose of analyzing the economic consequences of the the 10th Circuit decision, it is important to note the best indicator of value is not drilling activity, but production. Production is the key because when a natural gas well becomes a producer, it has value, while a dry hole does not. Because a producing well can have a production life of between 5 and 50 years its true economic value must be judged by multiplying its annual value by its estimated production life. Accordingly, though drilling since the

expiration of the tax credit has waned (and virtually stopped within the boundaries of the Reservation since the 10th Circuit decision) production and its corresponding impact on taxation valuation continue a strong increasing trend. Even though drilling peaked in 1990 (App. 12a, La Plata County Drilling Permits and Production Values) production and valuation numbers have increased up to 1997 (App. 12a, La Plata County Drilling Permits and Production Values) and this trend will continue to increase unless the properties at issue herein become exempt from taxation.

Conversely, with the increase in production, total valuation for purposes of assessing *ad valorum* taxation against oil and gas properties increased from 1988 to 1998, from 44.5 million dollars to 561.5 million dollars, an increase of 1300%. (App. 10a, Total Valuation: La Plata County, Colorado 1988-1998).

The Court should be made aware that the most significant portion of this production and valuation growth, as well as tax revenue increases linked to it is the result of the growth of CBM, the gas at issue in this case. The economic forecast of the effect on local goverment if this decision remains final is catastrophic. As indicated *infra* at pp. 8-9, the best estimate of the loss of local government revenue lost as a result of the 10th Circuit decision is between 100 million and 160 million dollars. This revenue will be taken away from the schools, special districts and County services.

REASONS FOR GRANTING THE PETITION

A. The Decision of the Tenth Circuit is Disruptive of Long Standing Rules of Property and Established Federal Policy Which Should Not be Abandoned.

While CBM is the subject of this petition, the historical development of oil and gas, within La Plata County, is based upon long standing rules of property, including ownership and the

administration of the federal mineral patent system which has been in place for over 120 years. The Tenth Circuit decision has disrupted an entire industry and uprooted the long standing, historically established rights of the royalty owners. Some of these royalty owners hold patents issued by President Wilson, in 1918; many of them are elderly or have fixed incomes on small farms and are children or grandchildren of the original patentees. The existing ruling threatens their entire way of life.

Moreover, because the alternative fuels tax credit which accelerated the CBM boom extended to royalty owners, lessors and the industry, a determination that those tax credits were wrongfully taken will have a disastrous impact on the individual royalty owner. It is estimated that if this decision is sustained, the financial impact on the royalty owners would be ten times the original tax credit, due to the peculiar way that a tax credit when abrogated is translated on the royalty owners' amended tax return. Simply put, if the royalty owners are no longer the owners of the coalbed methane, they lose the benefit of the tax credit and may face serious economic consequences. Thus, a royalty owner who originally received a $1,000 tax credit could owe $10,000 to the Federal Government, a price many could not afford to pay.

As Petitioner emphasizes, this case involves a reversal of long standing Federal Government policy. For many years, and certainly since the Solicitor's opinion in 1981 every affected entity (the petitioner, the royalty owners, the school districts, special districts and La Plata County), have relied upon the benefits flowing from the existing system, the Solicitor's opinion and the tax credit. They have also borne the administrative and legal burdens which came with the development of coalbed methane. For example, the County has expended millions of dollars administering its oil and gas regulations and improving the County roads subjected to increased drilling activity.

While the position of the Department of the Interior, their Solicitor and the Solicitor General's office has yet to be fully determined, it is obvious that since their filing of their first brief

in the Tenth Circuit, the Department of the Interior, by their Solicitor and the Solicitor General's office have not steadfastly supported the earlier established federal position. Indeed, absent filing a brief with this Court in complete support of the Solicitor's opinion, the Federal Government will consciously abandon the Solicitor's opinion or, at a minimum, fail to steadfastly follow the course launched by the government in 1981. The Solicitor General may even support a complete reversal of what the Department of the Interior stated was federal policy.

La Plata County submits that such a reversal or dilution of express federal policy cannot occur without well stated reasons and none have been offered. Absent such justification, federal policy should remain as stated in 1981.

This Court should review the decision of the Tenth Circuit to ensure that the Federal Government may not abandon its position, as originally set forth in an opinion of the Solicitor of the Department of the Interior as well as the Congressional mandate encouraging development of this valuable resource.

B. The Decision will Wreak Financial Havoc with Local Government.

Because the Tribe, is exempt from taxation, the practical financial effect for local government is that the revenue received from the coalbed methane will be lost by local governments, school districts and all special districts. This would be a financial catastrophe.

Although the calculations for the life of the CBM field are subject to much debate, the preponderance of valid evidence suggests that the field where this coalbed methane is located has a life of between 10 to 50 years. More importantly, it has recently been demonstrated that the original estimate regarding the size of the coalbed methane field at issue has been grossly underestimated

as the original gas-in place estimate for the entire San Juan Basin Fruitland formation, 50 Tsf, has now been found to be at least 100 Tsf. Charles R. Nelson, *Advances in Coalbed Reservoir Gas-In Place Analysis, Gas Research Institute, 1998,* at p. 9.

La Plata County's estimate of the reduction in property tax revenue incidental to this decision is not precise. We are told that Amoco's share is 40% of all coalbed methane at issue and that they are entitled to a tax abatement of 1.9 million dollars per year. Consequently, we believe that the total amount of money which would be taken away from the school districts, special districts, and the County, all of which are dependent on *ad valorum* taxation would be, at present values, approximately 4 million dollars a year. Given a conservative analysis it is probable that the result of this decision, over the median expectations regarding the life of the field at 25 years, would be a reduction of revenue for schools, special district and the County of 100 million dollars. To paraphrase Senator Everett Dirksen, a million dollars here and a million dollars there soon add up to real money. If the life of the field at issue were to be 40 years, we are facing a loss of 160 million dollars in taxation revenue. Even if the lowest estimate of the life of the field were applied for 10 years, the potential loss to the school districts, special districts and the County would be 40 million dollars, a catastrophic amount.

Thus, if this decision remains final and is not reviewed by this Court, it will wreak financial havoc with all local government, local education and special districts in La Plata County.

C. The Magnitude of this Case Demonstrates it can Only be Resolved by Review by the United States Supreme Court.

According to the Tribe's own evaluation, at a minimum, the value of the coalbed methane at issue in this case is 1 billion dollars. Dave Staats, *Tribe Wins Again in Coal-Bed Methane Case*, The Durango Herald, July 21, 1998 at 1a.

The decision of the Tenth Circuit constitutes a reversal of express federal policy in place for at least 17 years and, from the perspective of the royalty owners and Amoco, a disruption of their property rights which were in place long before the Solicitor's opinion.

This case involves resolution of a dispute which has its origins in a clear legal conflict between two different adminstrations of the Executive Branch and the Congress. It further involves significant, differing intrepretations of mineral and taxation policy. A review by the Court will define the future relations between the Federal Government, a Sovereign Nation, the State, 3 school districts, a County, numerous special districts, 3,000 royalty owners and an industry with countless individual investors.

The decision of the Tenth Circuit, for the reasons set forth in the Petition for Certiorari, and this brief, is a legal, scientific, historical and logical aberration. A case of this magnitude can only be resolved by a reasoned decision by the United States Supreme Court.

CONCLUSION

This Court should grant the petition for certiorari of Amoco Production Company, Inc.

Respectfully submitted this 22nd day of December, 1998.

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APPENDIX

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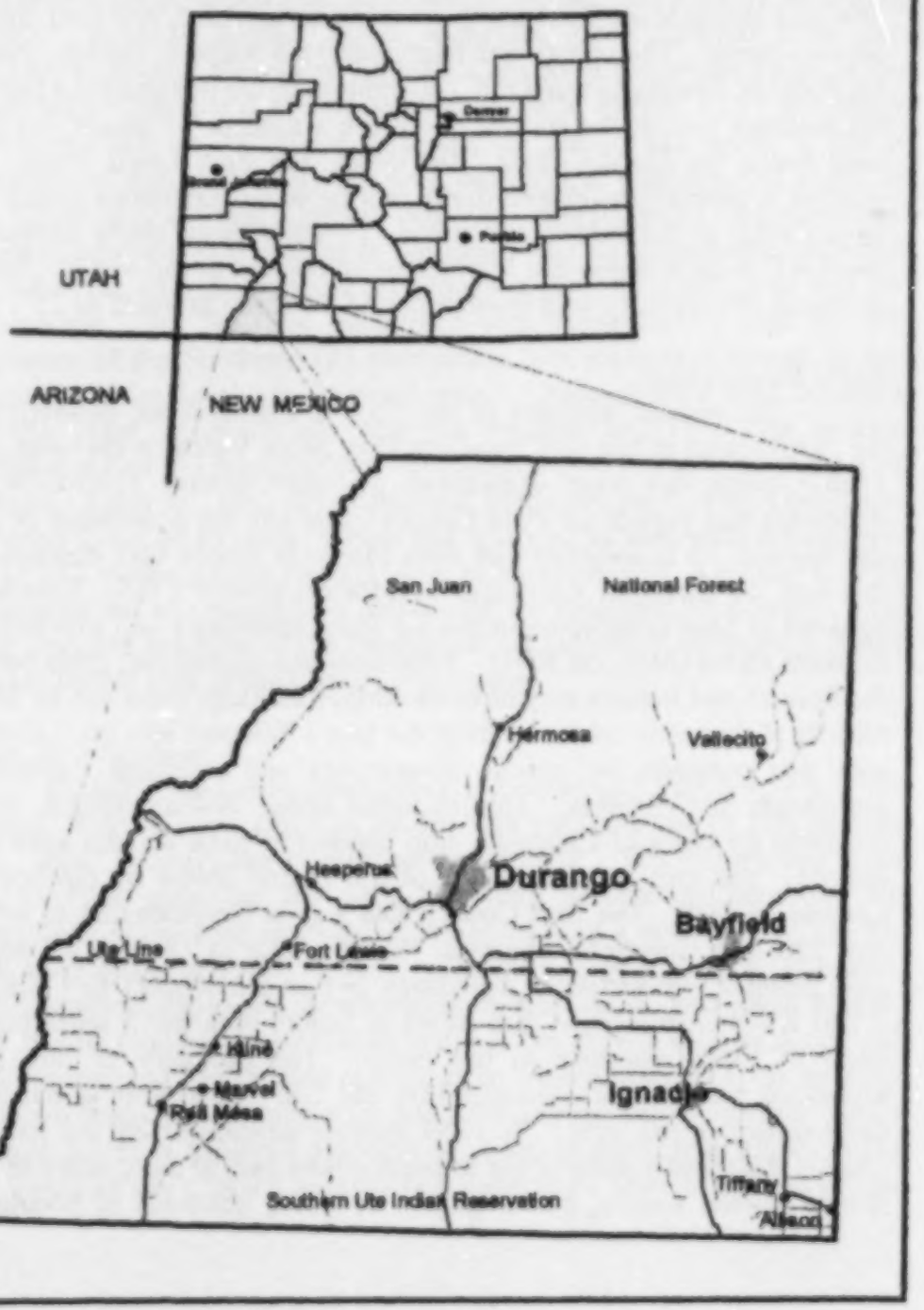
Vicinity Map of
La Plata County, Colorado



LA PLATA COUNTY, COLORADO

Geography

La Plata County is located in southwestern Colorado in what is known as the Colorado Plateau bordered in the north and east by mountains that reach elevations of 14,000 feet. During the first 75 years after discovered by non-native peoples, the natural barrier of mountains and remoteness retarded economic development and settlement of the area. The land slopes toward the south reaching as low as 5,900' near the New Mexico border. The county has four rivers: the Animas, Florida, Pine and La Plata, all flowing to the south. In addition to the mountainous terrain in the northern part of the county, there are a number of mesas, the major ones being the Florida Mesa, Red Mesa and Fort Lewis Mesa. The weather is generally mild with the exception of the mountains where it can be subarctic at the higher elevations. Temperatures rarely exceed 100 degrees F in the summer nor lower than 10 degrees in the winter. Rainfall is around 19" annually with the mountains receiving as much as 25".

Early Exploration

The earliest residents of the County were Indians, believed to be the descendants of the cliff dwellers after Mesa Verde to the west of La Plata County had been abandoned probably around 1100-1200 AD. Following that period, La Plata County came into the possession of Spain and Mexico. It is believed that Juan Maria de Rivera was dispatched to this area by Governor Cauhupin of Mexico around 1765. Rivera was believed to have prospected in the La Plata Mountains and proceeded as far north as the Gunnison River. Following this expedition, trade between the Spanish and Indians may have developed although there are no official records of this early trade. During the late 1700s and into the 1830s, the area was transited by various adventurers and suppliers traveling to settlements in California. This included Major William Gilpin, later a territorial governor of Colorado, who conducted some actions against the Indians. The area became a part of the United States by the Mexican Cession of 1848. The first County seat was at Howardsville in what is now San Juan County to the north. In the winter of 1849 an adventurer, John Fremont, conducted an expedition to find a new route to California. It was a winter expedition that ended in failure with much suffering and death of many members in the party. The publicity of this failed expedition was further evidence that the San Juans were a barrier to development of the area. In 1859 another adventurer by the name of Charles Baker led a party of six to the northern part of the County to what is now Eureka seeking placer gold. By 1861, hundreds of people had

invaded the area and occupied the eastern slope of the San Juans looking for gold strikes. Similar forays were made in the 1860s but it wasn't until 1872 that many more miners in what is now La Plata County and are considered the first non-native settlers.

Earlier Settlers

By 1873, mining towns had been established: Animas Forks, Eureka, Silverton, Mineral Point and Howardsville. The first county seat was Howardsville named after Lieutenant Howard, and a center of mining activity. In 1874 another group sponsored by T. Parrott from San Francisco expanded activity in La Plata Canyon in the western part of the County and it became a sizable settlement called Parrott City. It became the County seat in 1875 and remained so until 1881 when it had a population of nearly 500. By this time, agricultural activities had begun to take place in La Plata County and this offered more occasions for disagreements with the Indians in the area. The disagreements continued even after the Ute Reservation was founded through treaty with the US Government. In 1880 an agreement was made that firmed up the boundaries of the Southern Ute reservation was made that firmed up the boundaries of the Southern Ute reservation. Although there were incidents over the years, generally the relations between the Tribe and settlers avoided some of the most serious difficulties experienced in other parts of the State. Later in 1892, the abandoned military post of Fort Lewis was converted to use as an Indian school and operated as such until it reached a total of 132 students from various tribes of the southwest. On May 4, 1889 the reservation was opened for settlement by President McKinley. This action changed the face of the reservation considerably although it is still the least settled area of the County even today.

Rapid Development

By 1880, the County population increased to 5,509, a 4,399, 395% increase. Such a rapid rise in a decade was not expected to ever happen again. Until recently that projection was correct. The growth rate from 1990 to 1998 exceeded the 1872-1880 rate in absolute numbers: the County population shot up from 32,284 in 1990 to a projected 42,174 for 1998, an increase of 9,781 or 30%. Generally, over the years, whenever mining interests expanded, development in the County was much higher. Other factors, however, contributed to the 1880s growth such as the arrival of the Denver and Rio Grande railroad from Alamosa in 1881, the opening of the two banks and a newspaper, and a flourishing cattle business. Since that time, La Plata County's economy has become more diversified. In the early years of the County, mining and agriculture were mainstays of the

local economy. Durango World War II, uranium processing was begun for the war effort and in the 1950s the oil and gas industry expanded rapidly bringing a new wave of mineral industry workers to the area. Even now the energy industry plays an important role in the County's development and its economy.

County Economy

Although from the earliest years of the County's history, the extractive industries such as gold, silver and coal mining, uranium processing after WWII, and oil and gas drilling and processing and agriculture were the mainstays of La Plata County's economy. The most recent surge occurred after 1987 when the federal government provided a tax credit for alternative fuels development. Since then more that a 1,000 new coal bed methane gas wells have been drilled in the County. However, the economy has expanded and diversified considerably since the 1950s. Agriculture and mining play a lesser role in the County than in the past. However, in 1998, the energy industry still represents about 40% of the county tax base. Tourism and activities related to tourism represent about 33% of the County economy. The sales of agricultural products is less than 2% of retail sales in the County and agricultural property is less than 1% of the property tax base. Major tourist attractions to the County include the Durango and Silverton Railroad which carries about 200,000 passengers a year 45 miles to the north to Silverton and return. Also, Mesa Verde 40 miles to the west attracts 600,000 to 700,000 visitors a year to the area. The Durango-Purgatory Ski Resort serves 300,000-350,000 skier days annually and attracts visitors to the area when there is traditionally a downturn in the local economy between late November and early April. The peak tourist activity occurs between Memorial Day and Labor Day each year. That's when there may be as many as 40,000+ more people in the County visiting tourist attractions, camping, kayaking, mountain biking or shopping, Since the County has Fort Lewis College, the only four year degree granting institution in Southwestern Colorado, it is also a cultural center for this area. The County is the regional commercial, cultural, and medical services center for this part of Colorado. The area is served by the Durango/La Plata County airport and US 550 for north/south travel and US 160 for east/west travel. There is considerable economic leakage for retail sales to the south in Farmington, New Mexico which offers greater diversity of consumer products. This may be somewhat mitigated as a major retailer is opening a 180,000 square foot anchor store in a new mall south of Durango in July 1998. The construction industry has been a major player in the County economy the last seven years. As we close out the 1990s, La Plata County is experiencing one of the longest periods of

economic growth in its history. Employment has grown more than 33% since 1990 and unemployment (3.9%) is at its lowest ebb in more than 20 years. The economic picture for the county looks positive for the next couple of years with more diversity coming to La Plata County each year.

Tribal Enrollment

Ignacio, Colorado

The Southern Ute Indian Tribal membership is comprised of the Mouache and Capote bands of the Ute Nation. Intermarriage with non-tribal and other Native American Indian Tribes has resulted in the establishment of a Tribal Consitutional requirement that requires persons requesting to be considered for enrollment, into the Southern Ute Indian Tribe, possess 1/4 or more of Southern Ute Indian blood.

Age Group	On Reservation		Off Reservation		Subtotal		Total	Percent of Membership
	Male	Female	Male	Female	Male	Female		
0 - 17	152	169	88	80	240	249	489	38%
18 - 40	172	170	88	79	260	249	509	39%
41 - 55	65	76	13	21	78	97	175	13%
56+	44	47	20	21	64	68	132	10%
Subtotals	433	462	209	201	642	663	1305	100%

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American Indian Reservations and Trust Lands

Name	1990 Population	Land Area (Sq. ft. Miles)	Persons For Whom Poverty Status Deter-mined	% Below Poverty Level
Acoma Pueblo and Trust Lands, NM	2,590	416.7	2,578	49.65
Acoma Pueblo, NM	2,590	411.3	2,578	49.65
Acoma Trust Lands, NM	0	5.4	0	0.00
Agua Caliente Reservation, CA	20,206	49.6	19,575	10.46
Alabama and Coushatta Reservation, TX	478	7.0	548	23.36
Alamo Navajo Reservation, NM	1,271	99.0	1,259	58.86
Allegany Reservation, NY	7,315	41.0	7,128	18.73
Alturas Rancheria, AK	5	0.0	3	0.00
Annette Islands reserve, AK	1,469	128.9	1,458	9.81
Augustine Reservation, CA	0	1.0	0	0.00
Bad River Reservation, WI	1,070	192.0	1,031	45.30
Barona Rancheria, CA	537	9.2	573	14.14
Bay Mills Reservation, MI	461	3.5	438	35.16
Benton Paiute Reservation, CA	63	0.2	75	64.00
Berry Creek Rancheria, CA	2	0.1	0	0.00
Big Bend Rancheria, CA	3	0.1	5	0.00
Big Cypress Reservation, FL	484	81.9	449	19.38
Big Lagoon Rancheria, CA	22	0.0	12	0.00
Big Pine Rancheria, CA	452	0.4	455	23.30
Big Sandy Rancheria, CA	51	0.4	59	32.20
Big Valley Rancheria, CA	108	0.2	81	29.63
Bishop Rancheria, CA	1,408	1.4	1,428	25.21
Blackfeet Reservation, MT	8,549	2371.4	8,278	46.96
Blue Lake Rancheria, CA	58	0.0	53	11.32
Bois Forte (Nett Lake) Reservation, MN	358	163.0	333	39.64
Bridgeport Colony, CA	49	0.1	28	64.29
Brighton Reservation, FL	524	57.0	524	19.08
Burns Paiute Reservation and Trust Lands, OR	163	18.9	198	34.34
Burns Paiute Reservation, OR	163	1.3	198	34.34
Burns Paiute Trust Lands, OR	0	17.6	0	0.00
Cabazon Reservation, CA	819	3.4	850	27.76
Campo Reservation, CA	281	25.8	261	24.90
Camp Verde Reservation, AZ	618	1.0	609	62.56
Canoncito Reservation, NM	1,189	121.6	1,189	59.80
Capitan Grande Reservation, CA	0	20.5	0	0.00
Carson Colony, NV	248	0.2	262	33.59
Catawba Reservation SC (state)	174	1.1	170	27.06
Cattaraugus Reservation, NY	2,178	33.7	2,180	28.17

Name	1990 Population	Land Area (Sq. ft. Miles)	Persons For Whom Poverty Status Deter-mined	% Below Poverty Level
Cedarville Rancheria, CA	8	0.0	10	100.00
Chehalis Reservation, WA	491	7.0	486	40.95
Chemehuevi Reservation, CA	358	49.5	325	24.92
Cheyenne River Reservation, SD	7,743	4265.3	7,705	46.32
Chicken Ranch Rancheria, CA	73	0.1	66	0.00
Chitimacha Reservation, LA	286	0.4	311	37.30

Name	1990 Population	Land Area (Square miles	Persons For Whom Poverty Status Deter-mined	% Below Poverty Level
Siletz Reservation, OR	5	5.8	0	0.00
Skokomish Reservation, WA	614	8.2	607	46.13
Skull Valley Reservation, UT	32	28.2	17	0.00
Smith River Rancheria, CA	104	0.2	179	2.79
Soboba Reservation, CA	369	9.1	435	25.98
Sokaogon Chippewa Community and Trust Lands, WI	357	2.9	333	64.26
Sokaogon Chippewa Community, WI	266	2.4	298	67.11
Sokaogon Chippewa Trust Lands, WI	91	0.4	35	40.00
Southern Ute Reservation, CO	7,804	1058.6	7,855	17.91
Spokane Ute reservation, WA	1,502	237.5	1,435	37.14
Squaxin Island Reservation and Trust Lands, WA	157	2.5	194	29.90
Squaxin Island Reservation, WA	0	2.2	0	0.00
Squaxin Island Trust Lands, WA	157	0.3	194	29.90
Standing Rock Reservation, ND-SD	7,956	3567.3	7,917	44.81
Stewarts Point Rancheria, CA	91	0.1	89	62.92
Stillaguamish Reservation, WA	113	0.0	112	76.79
Stockbridge Reservation, WI	581	34.8	563	25.04
Sulphur Bank (El-Em) Rancheria, CA	93	0.1	96	50.00
Summit Lake Reservation, NV	7	17.4	8	0.00
Susanville Reservation, CA	454	0.2	490	20.61
Swinomish Reservation, WA	2,282	11.4	2,277	15.42
Sycuan Reservation, CA	4	1.0	0	0.00
Table Bluff Rancheria, CA	48	0.0	45	64.44
Table Mountain Reservation, CA	51	0.2	44	22.73
Tama Reservation, GA (state)	22	0.1	20	70.00
Taos Pueblo and Trust Lands, NM	4,754	156.1	4,682	32.14
Taos Pueblo, NM	4,681	154.9	4,610	31.91
Taos Trust Lands, NM	64	1.2	72	47.22
Te-Moak Reservation and Trust Lands	949	27.8	950	35.68
Te-Moak Reservation, NV	31	11.2	27	22.22
Te-Moak Trust Lands, NV				
Tesuque Pueblo and Trust Lands, NM	697	27.0	700	15.43
Tesuque Pueblo, NM	697	26.5	700	15.43
Tesuque Trust Lands, NM	0	0.5	0	0.00
Tonawanda Reservation, NY	501	11.8	483	15.53
Torres-Martinez Reservation, CA	1,462	34.5	1,628	51.29

American Indian Reservation and Trust Lands

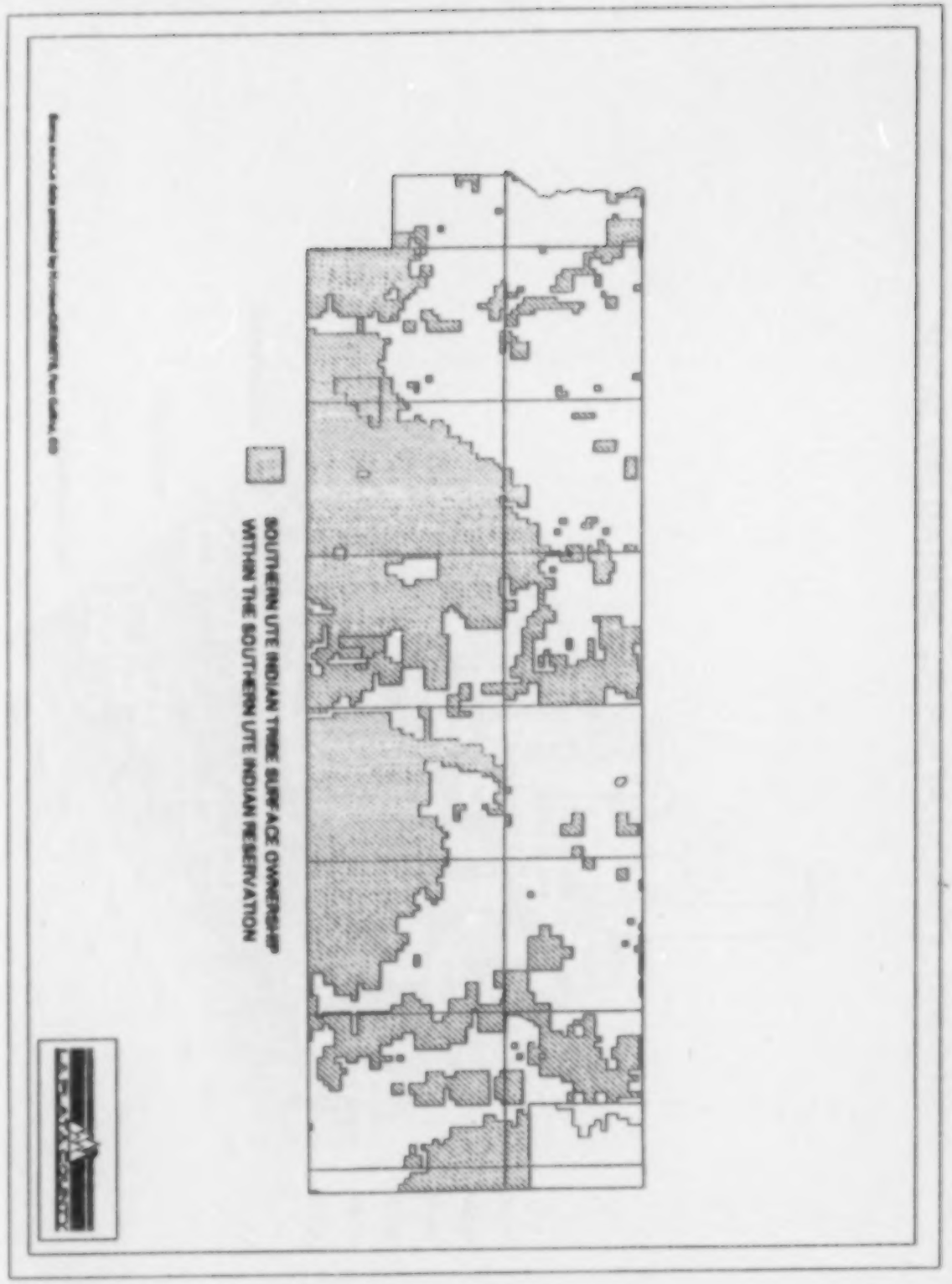
Name	1990 Population	Land Area (Square Miles)	Persons For Whom Poverty Status Deter-mined	% Below Poverty Level
Trinidad Rancheria, CA	78	0.1	71	4.23
Tulalip Reservation, WA	7103	35.2	7060	10.44
Tule River Reservation, CA	798	84.4	798	43.86
Tunica-Biloxi Reservation, LA	29	0.2	32	6.25
Tuolumne Rancheria, CA	135	0.5	85	25.88

Colorado Population Counts and Final Estimates, 1990-1997

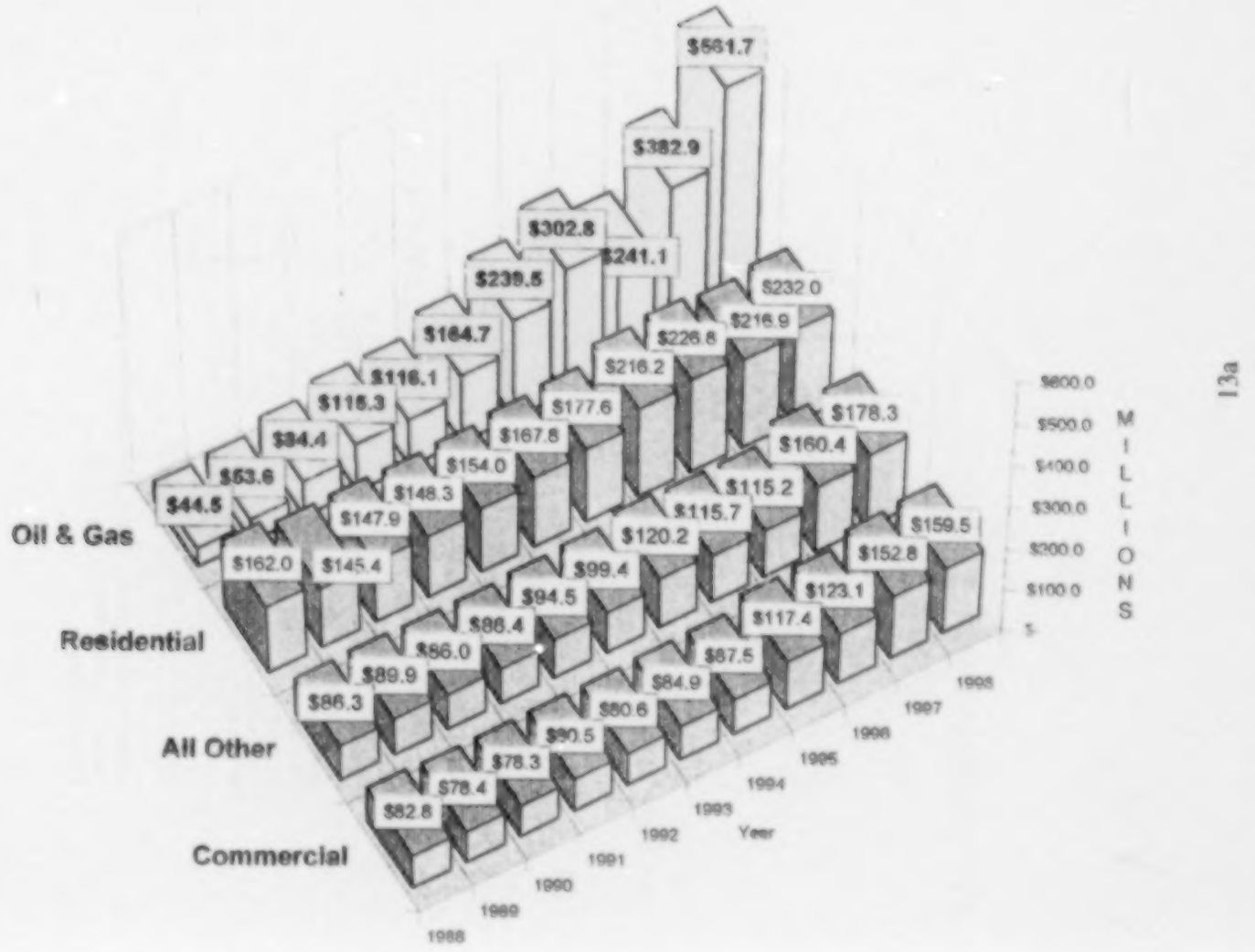
COUNTIES	April 1990	July 1991	July 1992	July 1993	July 1994	July 1995	July 1996	July 1997
COLORADO	3,294,473	3,373,094	3,471,610	3,579,936	3,680,140	3,771,527	3,852,362	3,935,332
Adams	265,038	270,866	276,321	283,279	290,730	299,775	307,394	314,191
Alamosa	13,617	13,825	13,909	14,152	14,486	14,941	15,355	15,703
Arapahoe	391,511	403,991	419,155	429,653	439,323	446,200	455,515	464,320
Archuleta	5,345	5,627	5,882	6,179	6,542	7,113	7,934	8,541
Baca	4,556	4,445	4,308	4,335	4,403	4,443	4,545	4,584
Bent	5,048	4,986	5,089	5,425	5,499	5,676	5,776	5,819
Boulder	225,339	230,814	238,094	246,821	252,118	256,737	260,842	264,975
Chaffee	12,684	12,908	13,202	13,822	14,272	14,868	15,386	15,716
Cheyenne	2,397	2,495	2,440	2,352	2,352	2,344	2,374	2,401
Clear Creel	7,619	7,651	7,839	8,032	8,451	8,675	8,705	8,868
Conejos	7,453	7,498	7,450	7,548	7,631	7,750	7,831	7,881
Costilla	3,190	3,234	3,151	3,278	3,298	3,411	3,461	3,500
Crowley	3,946	3,897	4,043	4,145	4,253	4,328	4,474	4,519
Custer	1,926	2,030	2,175	2,377	2,492	2,718	2,978	3,220
Delta	20,980	21,225	21,862	23,223	24,329	25,175	25,696	25,979
Denver	467,610	473,565	480,175	492,582	494,107	496,171	500,963	504,704
Dolores	1,504	1,444	1,415	1,444	1,523	1,598	1,675	1,721
Douglas	60,391	66,807	75,604	83,519	93,091	104,623	115,746	130,683
Eagle	21,928	23,073	24,213	25,716	27,468	28,860	30,392	32,099
Elbert	9,646	10,319	10,862	11,692	13,066	14,631	16,206	17,487
El Paso	397,014	405,225	421,451	435,101	453,726	466,172	472,739	481,780
Fremont	32,273	32,176	33,703	36,328	38,457	40,202	41,435	42,378
Garfield	29,974	31,140	31,177	32,331	34,160	35,980	37,140	38,252
Gilpin	3,070	3,092	3,250	3,384	3,511	3,683	3,810	4,058
Grand	7,966	8,233	8,320	8,506	8,773	9,219	9,601	9,879
Gunnison	10,273	10,402	10,750	11,271	11,617	11,906	12,161	12,307
Hinsdale	467	450	498	537	599	642	686	714
Huerfano	6,009	6,038	6,147	6,388	6,851	7,071	7,277	7,537
Jackson	1,605	1,583	1,624	1,708	1,743	1,733	1,742	1,771
Jefferson	438,430	449,614	463,449	476,073	483,254	491,089	497,774	503,915
Kiowa	1,688	1,703	1,731	1,750	1,762	1,726	1,763	1,779
Kit Carson	7,140	7,137	7,188	7,203	7,256	7,309	7,361	7,452
Lake	6,007	6,198	6,313	6,425	6,586	7,430	7,918	8,303
La Plata	32,284	33,499	34,592	35,842	37,237	39,190	40,230	40,939
Larimer	186,136	192,593	197,910	204,227	211,394	217,127	221,783	226,326
Las Animas	13,765	13,930	14,239	14,521	15,177	15,440	15,606	15,795
Lincoln	4,529	5,496	6,107	6,067	6,191	6,300	6,501	6,549
Logan	17,567	17,316	17,227	17,468	18,161	18,527	18,653	18,828
Mesa	93,145	96,128	97,659	100,271	103,263	106,035	108,293	110,668
Mineral	588	561	573	575	612	630	669	679
Moffat	11,357	11,432	11,661	11,751	11,935	12,111	12,200	12,464
Montezuma	18,672	19,020	19,577	20,528	21,241	21,965	22,414	22,696
Montrose	24,423	25,239	26,156	27,186	28,365	29,494	30,272	30,996
Morgan	21,939	22,710	23,495	24,261	25,115	25,396	26,083	26,696

Colorado Population Counts and Final Estimates, 1990-1997

COUNTIES	April 1990	July 1991	July 1992	July 1993	July 1994	July 1995	July 1996	July 1997
COLORADO	3,294,473	3,373,094	3,471,610	3,579,936	3,680,140	3,661,527	3,852,362	3,935,332
Otero	20,185	20,487	20,499	20,734	20,884	21,189	21,339	21,457
Ouray	2,295	2,412	2,521	2,632	2,872	3,046	3,203	3,264
Park	7,174	7,723	8,136	8,649	9,625	10,713	11,552	12,583
Phillips	4,189	4,222	4,254	4,412	4,446	4,536	4,572	4,654



TOTAL VALUATION: LA PLATA COUNTY, COLORADO

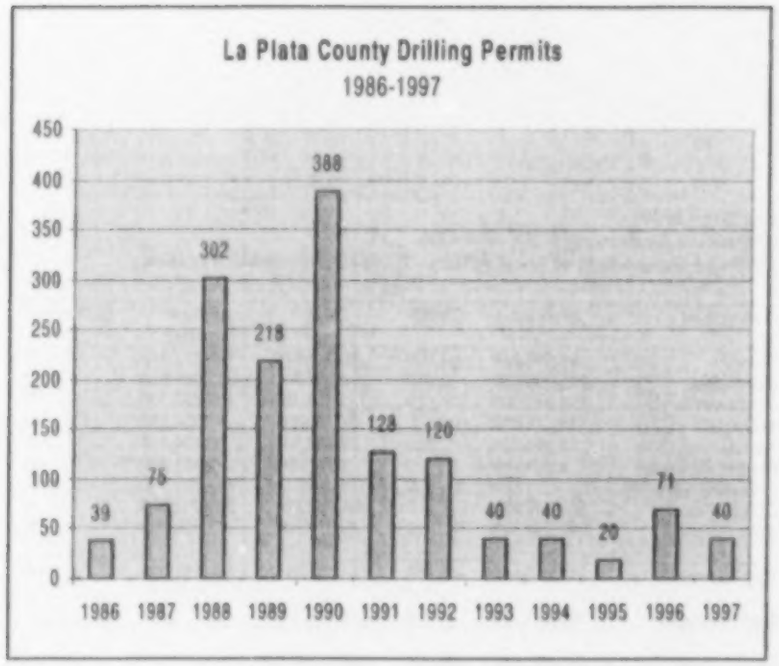


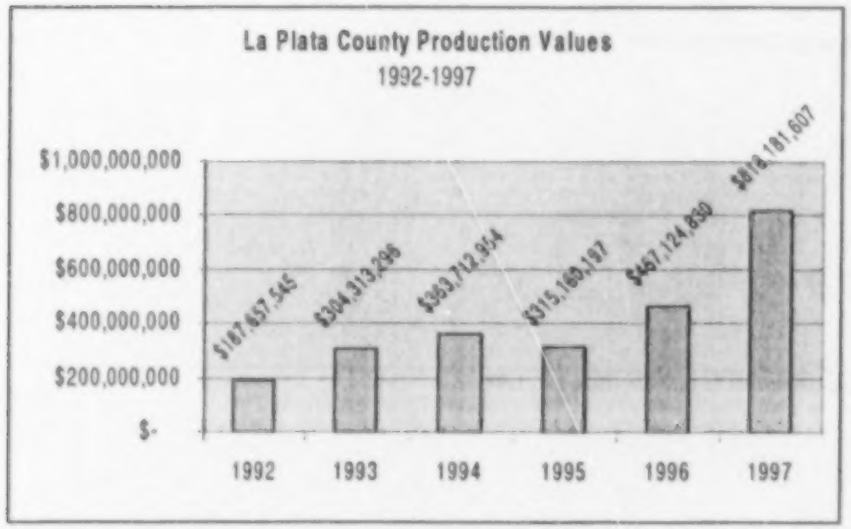
La Plata - 1998
Abstract of Assessment (CRS 39-5-123)
Colorado Department of Local Affairs - Division of Property Taxation

Description	Assessed	CBOE	Total	School District	Difference
Vacant	86,090,880	-68,070	86,022,810	86,022,810	0
Residential	232,048,900	1,910	232,050,810	232,050,810	0
Commercial	159,513,300	0	159,513,300	159,513,300	0
Industrial	31,214,650	0	31,214,650	31,214,650	0
Agricultural	10,434,030	510	10,434,540	10,434,540	0
Natural Resources	2,533,990	0	2,533,990	2,533,990	0
Producing Mines	0	0	0	0	0
Oil and Gas	561,742,810	0	561,742,810	561,742,810	0
State Assessed	48,058,100	0	48,058,100	45,058,100	0
Total Taxable:	**1,131,636,660**	**-65,650**	**1,131,571,010**	**1,131,571,010**	**0**
Total Exempt:	**102,827,550**	**0**	**102,827,550**		
Grand Total:	**1,234,464,210**	**-65,650**	**1,2345,398,560**		

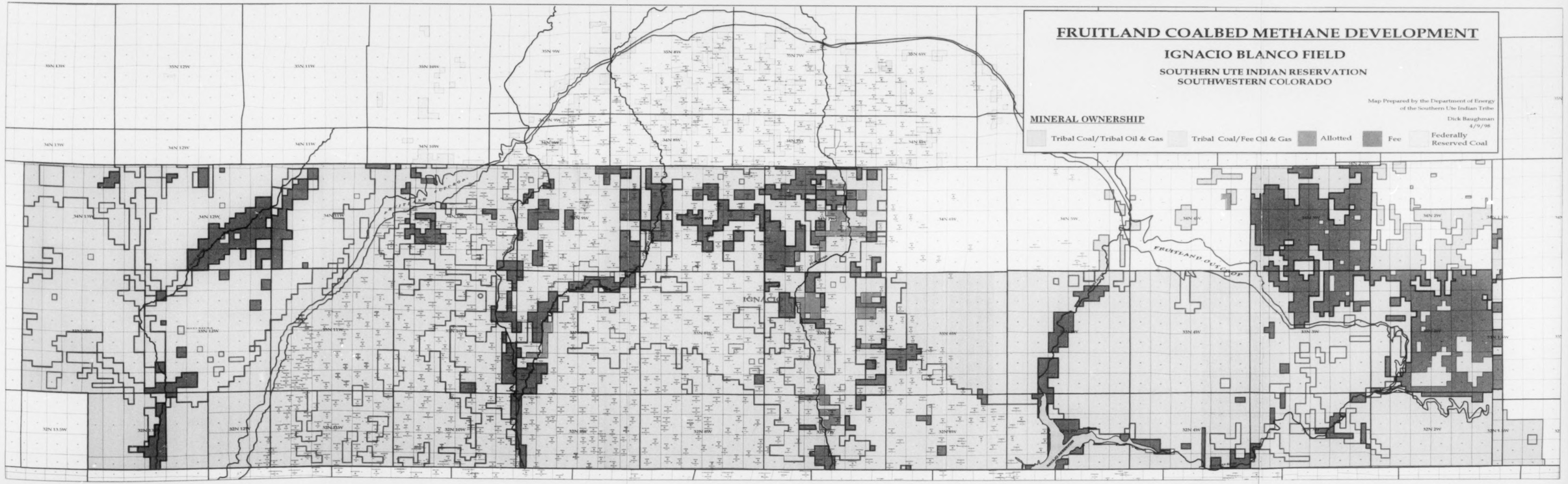
Total changes by County Board of Equalization: 8

FORM 101 AR 1968/1998 - 15 DPT AD - August 26, 1998





Source: Colorado Oil and Gas Conservation Commission


FRUITLAND COALBED METHANE DEVELOPMENT
IGNACIO BLANCO FIELD
SOUTHERN UTE INDIAN RESERVATION
SOUTHWESTERN COLORADO
Map Prepared by the Department of Energy
of the Southern Ute Indian Tribe
Dick Baughman
4/9/98
MINERAL OWNERSHIP
Tribal Coal/Tribal Oil & Gas
Tribal Coal/Fee Oil & Gas
Allotted
Fee
Federally Reserved Coal
FRUITLAND OUTCROP
IGNACIO

Supreme Court, U.S.
FILED
DEC 22 1998
OFFICE OF THE CLERK

No. 98-830

IN THE
Supreme Court of the United States
October Term, 1998

Amoco Production Company,
on behalf of itself and the class it represents,

Petitioners,

v.

Southern Ute Indian Tribe,

Respondent.

BRIEF OF AMICUS CURIAE CAMPBELL COUNTY, WYOMING IN SUPPORT OF PETITIONERS' REQUEST FOR CERTIORARI

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INTRODUCTION

Campbell County, Wyoming, a governmental entity, by and through the undersigned Counsel files this amicus curiae brief in support of the defendant class' petition for certiorari filed by Amoco Production Company.[1] The Tenth Circuit's holding in *Southern Ute Indian Tribe v. Amoco Production Company*, 151 F.3d 1251 (10th Cir. 1998), is of grave concern to Campbell County, Wyoming because it changes ownership rights in approximately 400,000 acres of land in the county which are owned by residents of our county. The decision will ultimately have a devastating economic impact on our institutions and on us as individuals. Campbell County, Wyoming therefore respectfully requests that the United States Supreme Court grant certiorari in the above-captioned case.

INTEREST OF AMICUS CURIAE

Campbell County Wyoming is located in the center of the Powder River Basin in northeastern Wyoming and borders Montana. Gillette is the county seat and largest town in the county. Mineral development has been, and is, of vital importance to Campbell County. According to the BLM records there are approximately 400,000 acres in Campbell County patented under the 1909 and 1910 acts and approximately 1.4 million acres in Campbell, Sheridan and Johnson Counties.[2] Campbell County is located in the coal and petroleum rich Powder River Basin. A large portion of

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[1] Campbell County, Wyoming is a county and files this brief pursuant to Rule 37.4 of the Rules of the Supreme Court of the United States. None of the parties authored this brief. The brief was authored by counsel of record.

[2] Information obtained from the Buffalo, Wyoming Resource Office of the BLM.

the economic activity in Campbell County involves natural resources development. Because the Powder River Basin in Campbell County is a mature basin for oil exploration, coalbed methane exploration and development is vital to the future of the local economy.

SUMMARY OF THE ARGUMENT

Campbell County, Wyoming and its residents will suffer economic impact if the Tenth Circuit decision is not reversed. Without the Supreme Court hearing the case, some residents of Campbell County, Wyoming who live on the Wyoming/Montana border will be treated differently for parcels of land patented under the same acts. The discovery and development of coalbed methane was undertaken with the understanding that coalbed methane belonged to the patentee and that development should be honored. Any protection offered by S. 2500, Public Law 105-367, 112 Stat 3313 (1998) will be short-lived upon the expiration of contracts and leases existing as of October 21, 1998. Consequently, Campbell County requests that the Supreme Court of the United States grant certiorari for this case.

ARGUMENT

I. *MINERAL OWNERS AND OIL AND GAS EXPLORATION COMPANIES HAVE RELIED UPON THE HISTORICAL TREATMENT THAT COALBED METHANE WAS GAS AND THEREFORE WAS INCLUDED IN THE GRANT TO THE PATENTEES.*

Campbell County's coalbed gas resources are enormous. Over the last six years, coalbed gas leasing, exploration, drilling, and production in Campbell County has

grown from virtually nothing into a major economic activity. The activity has been undertaken under the belief that coalbed methane gas belonged to the patentee or its successors under the 1909 and 1910 acts.[3] Coalbed methane development is the most active exploration activity currently underway in Campbell County. For example, between July 1996 and June 1997 (the month prior to the three judge panel decision in the 10th Circuit.)[4], 672 applications for permits to drill coalbed gas wells were filed for drilling on federal, private, and state lands in Campbell County.[5] During this same period, Campbell County ranked as the top county in the Rocky Mountain Region for coalbed gas permitting and drilling activities.

Approximately 400,000 acres of land in Campbell County were patented under the 1909 and 1910 Acts construed by the court in the 10th Circuit decision. Obviously, many landowners in Campbell County are successors-in-interest to original patentees under the Acts. These are ordinary people and make up a diverse group -- ranchers, working people, public employees, large landowners, small landowners, widows, and retired people. Because Congress reserved only the solid mineral coal under the 1909 and 1910 Acts and conveyed all other minerals to the patentees, Campbell County landowners who own lands patented under the 1909 and 1910 Acts own the oil and gas in their lands.

---

[3] Act of March 3, 1909, 35 Stat. 844 (30 U.S.C. § 81) ("the 1909 Act"); Act of June 22, 1910, 36 Stat. 583 (30 U..S. C. § 85) ("The 1910 Act"), (collectively known as the "Acts).

[4] Southern Ute Indian Tribe v. Amoco Production Co., 119 F.3d 816 (10th Cir. 1997).

[5] See Wyoming Oil and Gas Conservation Commission Website - http//wogcc.state.wy.us.

From the beginning of the coalbed gas exploration and development boom in Campbell County, everyone -- petroleum companies, mineral owners, landowners, coal mining companies, and the state and federal governments -- has treated coalbed gas as owned by the oil and gas estate owner. The original development of coalbed methane occurred because of oil and gas leases from mineral owners who received their interest under the 1909 and 1910 acts. The entire coalbed gas industry rests on the basic foundation that coalbed methane is a part of the oil and gas estate and naturally passed on to the patentees. Consequently, the growth of the coalbed gas industry has greatly affected and impacted Campbell County mineral owners who own the oil and gas estate in their lands, including those who own some of the 400,000 acres patented under the 1909 and 1910 Acts.

II. *THE DECISION WILL HAVE SEVERE ADVERSE IMPACT ON CAMPBELL COUNTY TAX REVENUE.*

The adverse impact on the tax revenues of Campbell County because of the decision is enormous.

Mineral owners execute oil and gas leases to exploration companies, granting the right to explore for oil and gas to the exploration companies. The mineral owner reserves a portion of the revenue free of cost in exchange for the right to explore for oil or the minerals. The amount reserved by the mineral owner is commonly referred to as the royalty interest. If the minerals are owned by the patentee or its successors, the royalty is paid to the fee mineral owners. If the mineral rights are owned by the United States, the federal government receives the royalty payment.

Campbell County receives an ad valorem (property tax) revenue in the amount of 5.97% of the value of production on royalty paid to fee mineral owners.[6] Campbell County does not receive tax revenue for Ad Valorem Tax on royalties paid to the United States because the local government entity cannot tax federal property. The difference in revenue to Campbell County because of lost tax revenue on royalty payments that will be made if the rights remain with the patentees compared to the tax revenue if the royalty payments are made to the United States under the decision is significant to the tax revenues of the County. Assuming 50% of the acreage subject to the 1909 and 1910 Acts is productive, and assuming that 50% of the productive acreage is unleased, there are 100,000 acres still subject to the Southern Ute Indian decision in Campbell County alone. (400,000 x .5 = 200,000; 200,000 x .5 = 100,000). Currently one well is being drilled on each 40 acre tract in Campbell County, Wyoming. Therefore there are 2,500 potential drill sites on unleased acreage. The average daily production rate of a CBM well in the Powder River Basin on every 40 acre tract is 200 mcf (200 thousand cubic feet) per well per day.[7] Based upon a cursory examination of the records in the Campbell County Clerk and Recorders Office, the average royalty reserved on leases from fee mineral owners is 15% of the value of the production. The average price for coalbed methane for 1998 has been $1.80/mcf. Therefore, the Southern Ute decision will cost Campbell County tax revenue of $2,941,717/year [(200/mcf/day x $1.80

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[6] See portions of the 1998 Wyoming Property Taxation prepared by the Wyoming Taxpayers Association logged with the Clerk of the United States Supreme Court .

[7] See Wyoming Oil and Gas Conservation Commission Website - http//wogcc.state.wy.us.

(price/mcf) x .15 (royalty rate) x .0597 (tax rate) x 365 (days per year) x 2500 (number of wells)].[8]

With current oil prices and coal prices falling, production of coalbed methane is necessary to maintain Campbell County tax revenues. Currently 18.22% of Campbell County's tax revenue is from ad valorem taxes on oil and 58.06% of the tax revenue is from ad valorem tax on coal production. The value of these commodities is decreasing and consequently the tax revenues to the County are decreasing. The valuation on coal decreased $61,464,820 or 6.5% from 1997 to 1998 and the valuation of oil decreased $48,333,619 or 15% from 1997 to 1998. Valuations are based on prior year prices. With current prices declining, next year's valuations will be even lower for oil and coal. In the same time frame, natural gas valuation rose from $29,135,435 in 1997 to $42,761,158 in 1998, an increase of $13,625,723 or 46.7%.[9] Virtually all of this increase in natural gas valuations is because of new coalbed methane production. Increased tax revenue from coalbed methane development is critical to Campbell County government functions.

In addition to the tax revenue to the Campbell County treasury, the impact of coalbed methane is significant to the

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[8] Using the same formula for the approximate 1.4 million acres subject to the decision in Campbell, Sheridan and Johnson County. The decision will cost the counties a total of $10,347,750 in lost tax revenue [1,400,000 x 5 = 700,000; 700,000 x .5 = 350,000. 350,000 ÷ 40 = 8,750 wells, 200 mcf/day x $1.80 x .15 x .06 x 365 x 8,750 = $10,347,750].

[9] See portions of the 1997 and 1998 Wyoming Property Taxation prepared by the Wyoming Taxpayers Association logged with the Clerk of the United States Supreme Court.

residents of Campbell County. The fee mineral owners are receiving royalty checks. Those revenues will be spent in the county. If the revenue goes to the federal government, local citizens will not spend it in the local economy.

III. *THE 10TH CIRCUIT DECISION HAS SIGNIFICANT IMPACT ON THE RESIDENTS OF CAMPBELL COUNTY WYOMING*

The decision is of extraordinary concern to the county because the Tenth Circuit changed ownership rights in coalbed methane gas in 400,000 acres of land in our county. The Tenth Circuit ruled that coalbed gas "was reserved to the United States" when Congress reserved "coal" under the 1909 and 1910 Acts. This ruling is not confined to the coal owned by the Southern Ute Indian Tribe; followed to its logical conclusion, the decision affects the ownership of coalbed gas in 16 million acres of land patented under the 1909 and 1910 Acts across the West.[10] According to the decision, mineral owners who own the oil and gas in lands as successors-in-interest under the 1909 and 1910 Acts do not own the coalbed gas.

For over eighty years, the patentees and their successors have conducted business believing gas was gas and not included as part of the coal. The mineral owners who were fortunate enough to have obtained production or executed leases, prior to October 21, 1998, have some relief. However, for those who do not have production, but have executed a lease, the protection expires when the lease expires under the current state of the law.

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[10] U.S. Dept. of Interior, Bureau of Land Management, Public Land Statistics, 1993, p. 16.

If the Supreme Court fails to hear the case, the residents of Campbell County will be stunned by the taking of their mineral interests by the Federal Government.

IV. *RECENT LAW DOES NOT SOLVE THE PROBLEM, AND INCONSISTENT TREATMENT BETWEEN MONTANA AND WYOMING IS FUNDAMENTALLY UNFAIR TO MINERAL OWNERS WHEN THE GEOLOGY IS THE SAME.*

Current economic activity on coalbed methane was initiated by companies obtaining leases from fee mineral owners, and developing it under the long-standing belief that gas was gas and belonged to the patentee. Although those efforts are protected by S. 2500 Pub. L. No. 105-367, 112 Stat. 3313 (1998), the efforts will be short-lived if the Supreme Court does not hear this case and ultimately reverse the decision of the Tenth Circuit. Businesses that have been developed on the belief that the patentee owns the coalbed methane will cease to exist. Ranchers who are dependent upon coalbed methane revenue in a down-agricultural market may be forced to liquidate. In general, a vital component to the future economy of Campbell County predicated upon the understanding that the patentee in 1909 and 1910 patents owned the gas. It is critical for the residents of Campbell County to have final resolution of this case with uniformity. It is fundamentally unfair for the Supreme Court not to hear the case.

Many ranchers in the northern part of Campbell County also own mineral rights in Montana that were patented under the 1909 and 1910 act. Because Montana is in the Ninth Circuit, and Wyoming is in the Tenth Circuit, the property rights will be treated differently even though the

chain of title is the same. It is illogical and inconsistent for the same owner to be treated differently on land just north of the Wyoming-Montana border than on land in Wyoming, which is part of the Tenth Circuit. In addition to the inconsistent treatment of the patentees, the confusing law will be difficult for the Department of the Interior to manage lands that are scientifically the same, but jurisdictionally different.

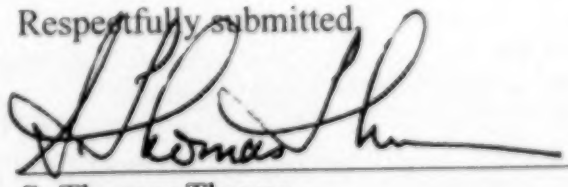
The Supreme Court should ultimately resolve the issue and resolve it in favor of the patentee.

CONCLUSION

We respectfully suggest that the issue of whether Congress retained coalbed gas when it reserved "coal" under the 1909 and 1910 Acts is of significant national importance and to Campbell County, Wyoming.

Dated: December 18, 1998.

Respectfully submitted,



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CERTIFICATE OF SERVICE

I hereby certify that on the 21st day of December, 1998, a copy of the foregoing **BRIEF OF AMICUS CURIAE CAMPBELL COUNTY, WYOMING IN SUPPORT OF PETITIONERS' REQUEST FOR CERTIORARI** was served upon the following parties by placing a correct copy in the United States Mail, first class postage prepaid, addressed to:

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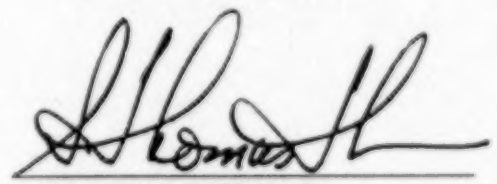

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Supreme Court, U.S.
FILED
DEC 22 1998
OFFICE OF THE CLERK

No. 98-830

In The

Supreme Court of the United States

October Term, 1998

AMOCO PRODUCTION COMPANY,
on behalf of itself and the class it represents,

Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,

Respondent.

On Petition For A Writ Of Certiorari To The United States Court Of Appeals For The Tenth Circuit

AMICI CURIAE BRIEF OF MOUNTAIN STATES LEGAL FOUNDATION, WYOMING FARM BUREAU FEDERATION, MONTANA FARM BUREAU FEDERATION, UTAH FARM BUREAU FEDERATION, AND NEW MEXICO FARM & LIVESTOCK BUREAU IN SUPPORT OF PETITIONERS

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OR CALL COLLECT (402) 342-2831

QUESTION PRESENTED

Whether, in reserving to the United States "coal" in the lands patented under the 1909 and 1910 Coal Land Acts, 30 U.S.C. §§ 81, 83-85, while passing the surface and all the other minerals (including natural gas) to the patentee, Congress reserved only the solid rock fuel commonly known as "coal," but not natural gas in coal formations, as the Department of Interior determined in a formal Solicitor's opinion entitled to judicial deference under *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984).

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AMICI CURIAE BRIEF OF MOUNTAIN STATES LEGAL FOUNDATION, WYOMING FARM BUREAU FEDERATION, MONTANA FARM BUREAU FEDERATION, UTAH FARM BUREAU FEDERATION, AND NEW MEXICO FARM & LIVESTOCK BUREAU IN SUPPORT OF PETITIONERS

Mountain States Legal Foundation respectfully submits this *amici curiae* brief on behalf of itself, the Wyoming Farm Bureau Federation, the Montana Farm Bureau Federation, the Utah Farm Bureau Federation, and the New Mexico Farm & Livestock Bureau in support of Petitioners. Pursuant to Supreme Court Rule 37(2)(a) this *amici curiae* brief is filed with the written consent of all the parties.[1]

IDENTITY AND INTEREST OF *AMICI CURIAE*

Mountain States Legal Foundation ("MSLF") is a non-profit, public interest legal foundation organized under the laws of the State of Colorado. MSLF is dedicated to bringing before the courts those issues vital to the defense and preservation of private property rights, individual liberties, limited government, and the free enterprise system. MSLF's members include individuals

[1] Copies of the consent letters have been filed with the Clerk of the Court. In compliance with Supreme Court Rule 37(6), *amici curiae* represent that no counsel for any party authored this brief in whole or in part, and that no person or entity, other than *amici curiae* and their members, made a monetary contribution for the preparation or submission of this brief.

and businesses from every state in the Union. Over one thousand of MSLF's members own property in Wyoming, Montana, Utah, and New Mexico, *i.e.*, States that have major reserves of coalbed gas. Petitioners' Appendix ("Pet. App.") at 181a.

Wyoming Farm Bureau Federation ("WFBF") is a voluntary, non-profit, general farm and ranch organization incorporated under the laws of the State of Wyoming. WFBF represents the economic, educational, and social interests of more than 8,500 member families throughout the State of Wyoming. Fifty percent of the commercial farmers and ranchers in the State of Wyoming are members of WFBF.

Montana Farm Bureau Federation ("MFBF") is a voluntary, non-profit, general farm and ranch organization incorporated under the laws of the State of Montana. MFBF represents the economic, educational, and social interests of more than 8,200 member families throughout the State of Montana. Twenty percent of the commercial farmers and ranchers in the State of Montana are members of MFBF.

Utah Farm Bureau Federation ("UFBF") is a voluntary, non-profit, general farm and ranch organization incorporated under the laws of the State of Utah. UFBF represents the economic, educational, and social interests of more than 22,000 member families throughout the State of Utah. A large majority of the commercial farmers and ranchers in the State of Utah are members of UFBF.

New Mexico Farm & Livestock Bureau ("NMFLB") is a voluntary, non-profit, general farm and ranch organization incorporated under the laws of the State of New

Mexico. NMFLB represents the economic, educational, and social interests of more than 14,500 member families throughout the State of New Mexico. Ninety percent of the commercial farmers and ranchers in the State of New Mexico are members of NMFLB.

Many of *amici's* members own lands that were patented under the various homestead laws and from which the coal was reserved to the United States pursuant to the 1909 and 1910 Coal Land Acts. Many of these members either actually settled the land they own or are direct descendants of the original settlers. A significant portion of these lands are located in areas that have huge potential for the production of coalbed gas, *i.e.*, Powder River Basin (39 trillion cubic feet of gas ("Tcf")), Green River Basin (31 Tcf), Unita Basin (10 Tcf), San Juan Basin (88 Tcf), and Raton Basin (18 Tcf). Pet. App. at 181a.

The U.S. Department of the Interior has long recognized that the United States reserved only the solid rock fuel "coal" in the 1909 and 1910 Acts. *See, Ownership of and Rights to Extract Coalbed Gas in Federal Coal Deposits* (M-36935), 88 Interior Dec. 538 (1981) (Pet. App. at 140a-159a). Based upon this interpretation, many amici's members granted the right to oil and gas companies to explore for and produce the gas, including coalbed gas, from beneath their properties in return for the payment of royalties based upon the amount of production. These royalty payments are a much-needed supplement to the income these members earn from their farming and ranching operations that feed this Nation. Many of these members desperately need these royalty payments for loan payments, farming and ranching equipment, their

children's education, health care, and an adequate retirement.

The Tenth Circuit's decision has disrupted the settled expectations of these members and will cause these members severe economic hardship. Under the Tenth Circuit's decision, many of these members may no longer be able to receive the royalty payments that they have come to expect. Other members may never receive any royalty payments even though their mineral estates contain huge coalbed gas deposits. Even more serious is the fact that under the Tenth Circuit's decision, members who have leased the right to explore for and develop the gas deposits underlying their lands may now may be subject to claims of conversion, trespass, and/or breach of warranty of title. If the Tenth Circuit's decision remains unchecked, these members may not be able to provide for their families, may be forced into bankruptcy, and may be driven out of the farming and ranching business – a lifestyle they love and an industry that the Nation depends on. Because *amici* have a significant interest in the issue in this case, they respectfully submit this brief in support of the Petition for *Writ of Certiorari*.

OPINIONS BELOW, JURISDICTION, AND STATEMENT OF THE CASE

Amici hereby adopt Petitioners' description of the opinions below, statement of jurisdiction, and statement of the case. *See*, Petitioners' Brief ("Pet. Bf.") at 1-13.

SUMMARY OF ARGUMENT

This Court should grant *certiorari* in this case for several reasons. First, the issue in this case is of national importance because it directly affects over 20 million acres and millions of American citizens. Second, although Congress passed legislation in a limited effort to reduce the impact of the Tenth Circuit's decision, that legislation did not answer the underlying issue in this case, it does not apply to millions of unleased acres, and it may have created more problems. Finally, the Tenth Circuit violated this Court's well-established principles of statutory construction and deference to agency interpretations.

ARGUMENT

I. THIS COURT SHOULD GRANT *CERTIORARI* BECAUSE THE ISSUE IN THIS CASE IS OF NATIONAL IMPORTANCE.

A. The Tenth Circuit's Decision Affects 20 Million Acres And Millions of Property Owners Throughout The West.

It has been the policy of this Court to grant *certiorari* in cases where an interpretation of a federal land grant statute has upset the settled expectations of millions of property owners. For example, in *Leo Sheep Co. v. United States*, 440 U.S. 668, 669 (1979), this Court granted *certiorari* to determine whether the United States, *sub silentio*, reserved an easement for the public to cross lands that were granted to Union Pacific Railroad. Because this issue affected "property rights in 150 million acres of land[,]" this Court granted certiorari. *Id.* at 678. Similarly,

in *Andrus v. Shell Oil Company*, 446 U.S. 657, 659 (1980), this Court granted *certiorari* to decide whether oil shale deposits located prior to the Mineral Leasing Act, 30 U.S.C. § 181 *et seq.*, were patentable under the savings clause in that Act. At stake was the ownership of hundreds of thousands of acres of lands located primarily in Colorado, Wyoming, and Utah. "[B]ecause of the importance of the question to the management of the public lands[,]" this Court granted *certiorari*. *Id.* at 663. Finally, in *Watt v. Western Nuclear, Inc.*, 462 U.S. 36, 37-38 (1983) this court granted *certiorari* to determine whether the "mineral" reservation in the Stock-Raising Homestead Act of 1916, 43 U.S.C. §§ 291-302, included gravel. Because of the importance of the issue "to the administration of more than 33 million acres of lands patented under the [Act]," this Court granted *certiorari*.[2] *Id.* at 42.

The issue in this case is far more important than the issues faced by this Court in *Leo Sheep*, *Shell Oil*, and *Western Nuclear*. The Tenth Circuit's decision affects coalbed gas reserves worth billions of dollars. Pet. Bf. at 14-15. If the Tenth Circuit's decision is allowed to stand, these reserves will never be developed; thus, injuring the mineral and royalty owners, destroying the economies of

[2] In *Andrus v. Charleston Stone Products Co., Inc.*, 436 U.S. 604, 605-606 (1978), this Court granted *certiorari* to determine whether water is a "valuable mineral" subject to entry and location under the General Mining Law of 1872, 30 U.S.C. § 21 *et seq.* Although not expressly stated in the decision, the fact that this issue affected all unappropriated and unreserved federal lands was certainly a major factor in the granting of *certiorari*.

the counties where these reserves are located, and depriving this Nation of a valuable clean-burning energy source.

More importantly, the Tenth Circuit's decision affects over 20 million acres of patented lands from which the United States reserved the coal pursuant to the 1909 and 1910 Acts, and related Acts. Pet. Bf. at 24. Because most of these lands were patented in 160 acre parcels, *see*, The Homestead Act (12 Stat. 392-93 (1864)), the Tenth Circuit's decision affects over 100,000 patents. Because many of the original settlers have transferred interests in the mineral estate they received from the United States to their descendants, heirs, and good faith lessees, the Tenth Circuit's decision could potentially affect millions of mineral and royalty owners. Therefore, this Court should grant *certiorari* to resolve the uncertainty in titles created by the Tenth Circuit's decision. *See, Leo Sheep*, 440 U.S. at 687 ("[t]his Court has traditionally recognized the special need for certainty and predictability where land titles are concerned").

B. The Fact That Congress Passed Legislation In A Limited Effort To Reduce The Impact Of The Tenth Circuit's Ruling Should Not Affect This Court's Decision To Grant *Certiorari*.

Outraged over the Tenth Circuit's ruling, Congress quickly passed legislation in a limited effort to reduce the impact of the ruling. P.L. No. 105-367, 112 Stat. 3312 (1998) ("Enzi Act"). The Enzi Act provides, *inter alia*, that "the United States shall recognize as not infringing upon any ownership rights of the United States" any existing

oil and gas lease or state drilling permit issued for the extraction of coalbed gas from coal reserved to the United States pursuant to the 1909 and 1910 Acts. *Id.*

Although well intentioned, the Enzi Act does not answer the question of who owns the coalbed gas or solve the problems created by the Tenth Circuit's decision. For example, the Enzi Act does not apply to interests in coal previously transferred by the United States to Indian tribes or other third parties. *Id.* More significantly, the Enzi Act does not apply to future oil and gas leases. *Id.* For example, in Montana, where coalbed gas development is in its early stages, the United States reserved the coal in 6.6 million acres under the 1909 and 1910 Acts. Therefore, mineral owners who have not yet entered into an oil and gas lease or sought to produce the gas from their mineral estate may only develop those reserves (and thereby reap the benefit therefrom) at a substantial risk. Accordingly, this Court should grant *certiorari* because Congress' limited effort to reduce the impact of the Tenth Circuit's ruling does not solve the problems created by that ruling.

II. THIS COURT SHOULD GRANT *CERTIORARI* BECAUSE THE TENTH CIRCUIT VIOLATED THIS COURT'S WELL-ESTABLISHED PRINCIPLES OF STATUTORY CONSTRUCTION AND DEFERENCE TO AGENCY INTERPRETATIONS.

A. The Tenth Circuit Should Have Applied The Ordinary Meaning Of The Term "Coal."

The issue in this case involves a simple question of statutory interpretation: does the reservation of "coal" in

the 1909 and 1910 Acts include coalbed gas? In interpreting a statute a court must give effect to the intent of Congress. *Griffin v. Oceanic Contractors, Inc.*, 458 U.S. 564, 570 (1982). The controlling intent is that of the Congress that actually passed the particular statute being interpreted. *Leo Sheep*, 440 U.S. at 681 ("[t]he pertinent inquiry in this case is the intent of Congress when it granted land to the Union Pacific in 1862"). The first place to look for that intent is the language of the statute itself. *United States v. Denver & Rio Grande Ry. Co.*, 150 U.S. 1, 10-12 (1893). When looking at the language of the statute, a court must "assume" that congressional intent is reflected by the ordinary meaning of the words used. *United States v. Labonte*, 520 U.S. 751, ___, 177 S.Ct. 1673, 1677 (1997) (citing *Moskal v. United States*, 498 U.S. 103, 108 (1990)); *Russello v. United States*, 464 U.S. 16, 21 (1983).

Applying this Court's well-established principles of statutory construction to the issue in this case reveals that when Congress passed the 1909 and 1910 Acts it intended to reserve only the solid rock fuel "coal." At that time, the term "coal" was consistently used to refer to the Nation's primary energy source, *i.e.*, the solid rock fuel.[3] *Southern Ute Indian Tribe v. Amoco Production Co.*, 874 F.Supp. 1142, 1154 (D. Colo. 1995) (Pet. App. 123a-124a). This meaning was in accordance with the definitions of the term "coal" found in the dictionaries of that time. *Southern Ute Indian Tribe v. Amoco Production Co.*, 1998 WL 404549 **15-16

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[3] By contrast, coalbed gas (which was then commonly referred to as "marsh gas") was a dangerous by-product of coal mining for which there was no present or future value. Pet. Bf. at 16-17.

(10th Cir.) (Tacha, J., dissenting) (reviewing dictionaries and general reference works of that era all of which described coal as a solid material) (Pet. App. 35-36). Thus, based upon the plain meaning of the term "coal" and simple common sense, Congress intended for the term "coal" in the 1909 and 1910 Acts to mean only the solid rock fuel.

The Tenth Circuit, however, failed to follow the teachings of this Court and created it own principles of statutory construction. Although the term "coal" has had a well-known meaning throughout the history of this Nation, the Tenth Circuit concluded that the term was "ambiguous." *Southern Ute Indian Tribe*, 1998 WL 404549 **4 (Pet. App. 14a). The Tenth Circuit based this conclusion on the fact that neither the 1909 Act nor the 1910 Act defined the term. *Id.* Based upon this purported ambiguity, the Tenth Circuit applied the presumption that ambiguities in federal land grants should be construed in favor of the sovereign and, therefore, gave the term "coal" its broadest possible meaning to include coalbed gas. *Id.*

The failure of Congress to expressly define "coal" in the 1909 and 1910 Acts does not mean that the term is ambiguous. *Southern Ute Indian Tribe*, 1998 WL 404549 at **17 (Tacha, J. dissenting) ("[s]ilence does not equate with ambiguity") (Pet. App. 40a). Indeed, under the Tenth Circuit's analysis, every undefined term in a statute would be ambiguous. That is why this Court has ruled that when Congress does not define a term in a statute, that term is to be construed in accordance with its ordinary meaning. *United States v. Smith*, 508 U.S. 223, 228 (1993) (citing *Perrin v. United States*, 444 U.S. 37, 44

(1979)). As demonstrated above, the ordinary meaning of "coal" is the solid rock fuel. Therefore, the Tenth Circuit violated this Court's well-established principles of statutory construction when it concluded that the term "coal" in the 1909 and 1910 Acts meant anything more than the solid rock fuel.

B. The Tenth Circuit Should Have Deferred To The Long-Standing Interpretation Of The Department Of The Interior.

Even if the term "coal" could somehow be construed to be ambiguous, the Tenth Circuit should not have applied the presumption that ambiguities in federal land grants should be construed in favor of the sovereign. To the contrary, the Tenth Circuit should have deferred to the long-standing interpretation of the Department of the Interior as this Court's previous decisions demand.

Since 1909, the Department of the Interior has consistently interpreted the term "coal" in the 1909 and 1910 Acts as meaning only the solid rock fuel. Shortly after the 1909 Act was enacted, the Department of the Interior issued a regulation to be applied when determining whether public lands contained valuable "coal" deposits. *Classification and Valuation of Coal Lands*, 37 Pub. Lands Dec. 653 (1909) (Pet. App. 137a-139a). That regulation mandated that coal deposits be classified based on gas free samples and valued on a per ton basis. *Id.* If the Department of the Interior believed the term "coal" to also include the worthless – and dangerous – "marsh gas," it would not have classified and valued coal deposits in such a manner. *See, Circular*, 38 *Int. Dec.* 183,

184 (1909) (construing 1909 Act to require the reservation of "coal" only in lands "chiefly valuable for coal"). For over eighty years, the Department never wavered from this interpretation. In fact, the Department of the Interior expressly ratified its interpretation on two separate occasions. *Ownership of and Rights to Extract Coalbed Gas in Federal Coal Deposits* (M-36935), 88 Interior Dec. 538 (1981) (Pet. App. 140a-159a); *Rights to Coalbed Methane Under an Oil & Gas Lease for Lands in the Jicarilla Apache Reservation*, 98 Interior Dec. 59 (1990) (Pet App. at 160a-177a).

Because the Department of the Interior had a long-standing, consistent interpretation of the term "coal," the Tenth Circuit should have deferred to that interpretation. Indeed, as explained by this Court:

> When faced with a problem of statutory construction, this Court shows great deference to the interpretation given the statute by the officers or agency charged with its administration. . . . "Particularly is this respect due when the administrative practice at stake 'involves a contemporaneous construction of a statute by the men charged with the responsibility of setting its machinery in motion; of making the parts work efficiently and smoothly while they are yet untried and new.' "

Udall v. Tallman, 380 U.S. 1, 16 (1965) (quoting *Power Reactor Development Co. v. International Union of Electricians*, 367 U.S. 396, 408 (1961); *accord, Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 884 (1984) ("considerable weight should be accorded to an executive department's construction of a statutory provision"). More importantly, when the Department of Interior interprets a federal land grant statute, the amount of

deference to be accorded to that interpretation is even greater. *See, United States v. Hammers*, 221 U.S. 220, 228-229 (1911). This greater deference is based upon the fact that the Department of the Interior's interpretation of those statutes affects interests in real property where certainty in title is paramount.[4] *Barden v. Northern Pacific R. Co.*, 154 U.S. 288, 326 (1894); *Leo Sheep*, 440 U.S. at 687. Accordingly, this Court should grant *certiorari* because the Tenth Circuit blatantly ignored previous decisions of this Court when it failed to defer to the long-standing interpretation of the Department of the Interior.

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[4] Interestingly, Judge Seymour, who authored both the panel and *en banc* decisions, previously recognized this rule of deference. *Aulston v. United States*, 915 F.2d 584 (10th Cir. 1990) (granting deference to the Department of the Interior's interpretation of the term "gas" in the Agricultural Entry Act of 1914, 30 U.S.C. §§ 121-125). Because Judge Seymour failed to follow this rule of deference in the instant case, she upset the settled expectations of millions of mineral and royalty owners.

CONCLUSION

For the foregoing reasons, *Amici* respectfully request that this Court grant the Petition for *Writ of Certiorari*.

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Dated: December 22, 1998

Supreme Court, U.S.
FILED
DEC 22 1998
OFFICE OF THE CLERK

No. 98-830

In The

Supreme Court of the United States

October Term, 1998

AMOCO PRODUCTION COMPANY, ON BEHALF OF ITSELF AND THE CLASS IT REPRESENTS,

Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,

Respondent.

On Petition For Writ Of Certiorari To The United States Court Of Appeals For The Tenth Circuit

BRIEF OF *AMICI CURIAE*, STATES OF MONTANA, NEW MEXICO, NORTH DAKOTA, UTAH AND WYOMING, IN SUPPORT OF PETITIONERS' REQUEST FOR CERTIORARI

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INTRODUCTION

The States of Montana, New Mexico, North Dakota, Utah and Wyoming (the *Amici* States), by and through their Attorneys General, respectfully submit this brief *amici curiae* in support of the petitioners class's petition for certiorari in *Amoco Production Co. et al. v. Southern Ute Indian Tribe*, No. 98-830. For the reasons discussed below, the impacts caused by *Amoco* are more serious than those that gave rise to similar natural resource cases decided by the Court. *See, e.g., Leo Sheep Co. v. United States*, 440 U.S. 668 (1979) (deciding access rights reserved by the federal government under a railroad grant); *Watt v. Western Nuclear, Inc.*, 462 U.S. 36 (1983) (deciding whether the federal government reserved gravel under the Stock Raising Homestead Act). The harm that the *Amoco* decision will cause to the interests of the *Amici* States merits this Court's careful attention.

INTERESTS OF THE *AMICI* STATES

The decision of the United States Court of Appeals for the Tenth Circuit represents a drastic departure from previously settled law governing ownership of coalbed methane (CBM) gas. If upheld, the Tenth Circuit decision will significantly harm not only the *Amici* States' tax bases and revenues, but entire economies within those States which have developed in reliance on the continuation of the status quo. In addition, as a practical matter, the Tenth Circuit decision would result in such confusion in implementation and chaos in regulation that application of the decision would be nearly impossible. The

result of the confusion, of course, would be many more years of litigation. Because of the profound effect the decision would have upon their sovereign, economic and regulatory interests, the *Amici* States are compelled to ask this Court to grant certiorari to eliminate the confusion created by the Tenth Circuit decision over ownership of CBM gas. The question to be brought before the Court is one of exceptional importance to the *Amici* States and their communities, as well as to state coal and gas regulators and taxing authorities, who have historically relied upon the principle that "gas is gas" and upon the 1981 Solicitor's Opinion for the determination of ownership of such gas.

SUMMARY OF ARGUMENT

The Tenth Circuit Court's decision, in stark contrast to the long-standing practice of both the mineral industry and of the Department of Interior, erroneously interprets CBM gas to be part of the coal reserve. From the *Amici* States' perspectives, this Court should grant review for two reasons. First, the decision is insupportable under any accepted definitions of "coal" or "gas," but, if allowed to stand will drastically impact individuals, communities and entire economies established in reliance on the principle that "gas is gas." Second, because the decision makes no practical sense, implementation of the decision will only lead to confusion and further litigation unless the matter is clarified by this Court. The *Amici* States request that review be granted for the sake of our citizens and communities who will be impacted by the decision, our tax bases in methane gas production which

will be affected by the decision, our public schools whose revenues derived from the school land grants will be impacted by the decision and our state regulatory agencies who will be forced to attempt to interpret and implement the decision.

ARGUMENT

I. THE TENTH CIRCUIT'S DECISION DISRUPTS YEARS OF INDUSTRY AND DEPARTMENT OF INTERIOR INTERPRETATION OF COALBED METHANE AS GAS, WARRANTING THIS COURT'S REVIEW.

The Tenth Circuit's decision has a direct bearing on the stability of the local economies in each of the *Amici* States. The *Amici* States are mineral rich states, accounting for much of the nation's coal production, as well as oil and gas production. Part of the natural gas production from within the *Amici* States is methane gas, including CBM gas. The *Amici* States' mineral owners and gas producers have relied on the 1981 Department of Interior Solicitor's opinion which concluded that the United States (i) did not reserve coalbed gas when it reserved "coal" under the 1909 and 1910 Acts, (ii) did reserve coalbed gas when it reserved "oil and gas" under the 1914 Act, and (iii) would regulate coalbed gas under gas, not coal, regulatory programs. *See Ownership of And Right to Extract Coalbed Gas in Federal Coal Deposits*, 88 Interior Dec. 538 (1981).[1] Those conclusions were affirmed by the

[1] To address energy supply issues arising from the Arab Oil Embargo, the federal government took steps to encourage

United States District Court for the District of Colorado. *Southern Ute Indian Tribe v. Amoco Production Co. et al.*, 874 F. Supp. 1142 (D. Colo. 1995). The Tenth Circuit Court of Appeals reversed. 151 F.3d 1251 (10th Cir. 1998).

The issues raised by Petitioners are critical to the *Amici* States and their citizens. For instance, within Wyoming's borders alone are 2.68 million acres directly affected by the Tenth Circuit decision, including 2.3 million acres where the federal government granted 1909 and 1910 Act patentees all minerals except coal and 377,000 acres where it granted 1914 Act patentees all minerals except oil and gas.[2] These lands form the core of leading CBM gas areas in Wyoming, such as the Powder River, Green River, Bighorn, and Wind River Basins. To date, the Wyoming Oil and Gas Conservation Commission has issued over 3,000 permits to drill CBM wells. Over 1,200 CBM wells have been completed and an additional 1,500 CBM wells are in the drilling process.

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development of domestic energy sources. It led efforts to convert coalbed gas from what was universally regarded as a hazard to the important natural gas resource it has become. *See, e.g.*, 88 I.D. at 539 (summarizing background and stating that the federal government "must resolve" the issues identified above "in order to expedite development of this energy source.").

[2] These statistics are understated because PUBLIC LAND STATISTICS breaks down grants by state only for patents issued before 1948. *See* PUBLIC LAND STATISTICS 54-55 (1997 ed.). Since 1948 an additional 167,000 acres have been patented under the 1909 and 1910 Acts with a reservation of coal and an additional 2.25 million acres have been patented under the 1914 Act with a reservation of oil and gas. *Id.*

Moreover, coalbed gas activities are projected to accelerate in the future. Nearly all of the CBM well activity in Wyoming is in the Powder River Basin. Gillette, Wyoming is the largest community in the Powder River Basin. Last year, in just one small area south of Gillette, Wyoming, the federal government disclosed the effects of drilling of more than 400 coalbed gas wells. *See* GILLETTE SOUTH COALBED METHANE PROJECT FINAL ENVIRONMENTAL IMPACT STATEMENT (Bureau of Land Management, Wyoming State Office, Buffalo Resource Area, 1997). Not all wells will be drilled on affected lands, but due to the "checkerboard" land pattern in the western states, the Tenth Circuit decision could impact any particular well, whether or not it is located on lands patented under the 1909, 1910 or 1914 Acts. *See generally Leo Sheep Co.*, 440 U.S. at 672. In addition to the rapid development of this natural resource, experts project that for environmental and other reasons natural gas consumption – consumption of which coalbed gas is an important part – will increase 40 times faster than all other energy consumption by 2015. *See* 1998 POLICY IMPLICATIONS OF THE GRI BASELINE OF U.S. ENERGY SUPPLY AND DEMAND at 4 (Gas Research Institute).

The recent and projected increase in CBM activities is by no means limited to Wyoming. Indeed, each of the *Amici* States has very similar interests to those of Wyoming which will be significantly impacted if the Tenth Circuit decision is allowed to stand. For instance, last year the Bureau of Land Management prepared an Environmental Impact Statement disclosing the effects of drilling over 600 CBM wells near Price, Utah and the anticipated effects of drilling of an additional thousand

CBM wells in the Uintah Basin. *See* PRICE COALBED METHANE PROJECT FINAL ENVIRONMENTAL IMPACT STATEMENT (Bureau of Land Management, Utah State Office, Moab District, 1997). The *Amici* States believe that this issue is of such great significance that the Tenth Circuit decision should not be allowed to stand without first receiving a careful review by this Court.

The Tenth Circuit's decision significantly affects the *Amici's* citizens and their States. First, the Tenth Circuit decision has a serious social impact on the citizens of the *Amici* States. There are at least hundreds of thousands of successors to 1909 and 1910 Act patentees throughout the states and many of the *Amici* States' school land grants are also subject to the reservations under those Acts. Some of these property owners were fortunate enough to have leases or contracts in place prior to the passage of Public Law 105-367, 112 Stat. 3313 in October of 1998. Most were not that lucky. The unlucky ones now face a real dilemma: either they lease their mineral interests for natural gas, and face the possibility of litigation over whether any gas production is CBM gas, or they do not lease and thereby lose potential royalty payments from non-CBM sources. Since natural gas migrates, if the owners do not lease, their neighbors could deplete their gas reserves. The people impacted are primarily individuals who planned to use royalty proceeds for purposes as diverse as land improvements, college educations, retirements and the like. Unfortunately, those successors to the 1909 and 1910 Act patentees have no certainty under of the Tenth Circuit decision. According to recent correspondence of the Department of the Interior, even oil and gas reservations to the Federal government under the 1914

Act are questionable until further guidance comes out of the *Amoco* litigation. *See* letter from Bob Armstrong, Assistant Secretary, Land and Minerals Management, United States Department of the Interior to Wyoming Governor Jim Geringer, dated October 9, 1998, appendix A. (Appendix to Brief of Amici Curiae States of Montana, New Mexico, North Dakota, Utah and Wyoming in Support of Petitioners' Request for Certiorari, App. 1-4) This Court should hear the case to bring certainty to people's lives and to minimize the social harms that will result from the Tenth Circuit decision.

Second, the consequences of the Tenth Circuit decision – consequences that will retard coalbed gas activities for years – will adversely affect state and local governments. Taxes levied directly on those who engage in mineral activities and those who provide goods and services to those industries contribute greatly to state and local government revenues. The *Amici* States receive severance taxes on CBM gas production, a portion of which is returned to the local governments. Any decline in production resulting from the uncertainty over CBM gas ownership as a result of the Tenth Circuit's decision will result in a loss of revenue to the *Amici* States and their local governments. The disruption of the tax revenues from natural gas production could be quite devastating to local governments within the *Amici* States.

The *Amici* States are also mineral owners of lands with 1909, 1910, and 1914 Acts reservations, including school lands. *See, e.g., State of Utah,* 38 Interior Dec. 245 (1909). As succinctly set forth by this Court in *Andrus v. Utah,* 446 U.S. 500 (1980), Congress granted each of the western public land states designated sections of federal

lands upon the respective states' admission to the Union, for the express purpose of supporting public schools. Title to these numbered sections did not vest in the respective states until completion of an official survey. Prior to the survey, the United States remained free to reserve or otherwise dispose of these lands. In recognition of the fact that portions of the grants might therefore be unavailable to the States due to prior disposition, Congress authorized grants of indemnity or "in lieu" lands of equal acreage. 446 U.S. 506-7. In 1906, President Theodore Roosevelt withdrew by executive order some sixty-six million acres of lands containing "workable coal" from entry under the public land laws. *See Amoco*, 151 F. 3d at 1264. In 1912, Congress acted to permit States to make in lieu selections of known federal coal lands, subject to a reservation of coal to the United States in accordance with the provisions of the 1910 Act. Act of April 30, 1912, 37 Stat. 105, *codified at* 30 U.S.C. § 90 (the "1912 Act").

The decision of the Tenth Circuit thus calls into question the *Amici* States' ownership of coalbed methane underlying all lands granted under the 1912 Act, as well as those acquired under the 1909, 1910 and 1914 Acts. This is not a small problem for the *Amici* States. In Utah, royalties from coalbed methane production are the largest single source of revenue from the State's school lands. If the *Amoco* decision is upheld, Utah could lose ownership of coalbed methane underlying more than 27,000 acres of school lands. The other *Amici* States would be similarly affected. For example, New Mexico could lose more than 10,000 acres and Wyoming more than 13,000 acres. Thus, the *Amici* States may very well be faced with elimination

of gas royalties from lands they own, whether school lands or others. The *Amici* States have consistently taken the position that their natural gas lessees have rights to all gas produced on the States' land, without regard to the initial origin of that gas. The *Amici* States' position has been supported by industry practice and the law that "gas is gas" and should follow the gas estate. The Tenth Circuit's decision will undoubtedly subject the *Amici* States to a plethora of future litigation over ownership of the *Amici* States' natural gas resources and over the royalties and revenues derived therefrom.

To be sure, as a result of the Tenth Circuit decision, the *Amici* States may enjoy 50 percent of the federal royalties derived from leases of CBM gas on lands patented under the 1909 and 1910 Acts. As a matter of principle, however, the *Amici* States believe that the decision reached by the Tenth Circuit is wrong on the merits. Moreover, the social and economic dislocations addressed above outweigh any economic windfall that might otherwise be forthcoming.

II. AS A PRACTICAL MATTER, THE TENTH CIRCUIT'S DECISION RAISES MORE QUESTIONS THAN IT ANSWERS, WARRANTING THIS COURT'S REVIEW.

As with most gases, coalbed methane is a mobile gas. While it originates in coal seams, it demonstrates no hesitance to migrate to adjacent formations. Thus, gas, which originally started as CBM, can be found and developed some distance from the coal seam from which it originated. Evidence in that regard before the District

Court and the Tenth Circuit demonstrated that CBM gas frequently migrates many kilometers and that world renowned gas deposits, such as those in the North Sea, have originated from coal and have migrated to such non-coal formations. While the Tenth Circuit's decision suggests that such gas would have been initially treated as "coal," once it is no longer adsorbed to the solid coal molecules, it appears that the CBM would change from "coal" to "gas" under the court's rationale. Prior to the Tenth Circuit's decision, segregation of natural gases according to their origin was not only impractical, but unnecessary since the natural gas owner's rights extended to all gas produced on his lands, regardless of origin. Now, while such segregation remains impractical, it may be necessary if the Tenth Circuit's decision stands.

To further complicate this matter, the *Amici* States contain a mixed or "checkerboard" land ownership pattern for both surface and subsurface estates. It is common to have adjoining sections of surface or subsurface lands owned by the federal government, the State, a railroad company or its successor in interest, a rancher, or a mineral company. Since the land ownership is so fragmented, any effect on the lands subject to the 1909, 1910, 1912 and 1914 Acts will also affect adjoining undisputed lands. Because of the migration of methane gas, entire natural gas production fields could be affected by the Tenth Circuit decision, even if individual wells are drilled on undisputed land.

The Tenth Circuit's decision is thus impossible to administer. Combining the checkerboard land and mineral ownership pattern in the *Amici* States with the propensity of natural gases, such as CBM, to migrate from

their place of origin will result in unavoidable confusion over ownership of those gases under that court's decision. That confusion will only lead to more litigation over natural gas ownership and entitlement to the royalties generated by its production. The *Amici* States believe that the Court should review the Tenth Circuit's decision to attempt to eliminate that confusion.

CONCLUSION

While the *Amici* States disagree with the Tenth Circuit's analysis and decision on the merits, at this stage of the proceedings, they have only attempted to demonstrate that the *Amoco* decision will create severe impacts on the *Amici* States' revenues, economies and lands and will result in serious confusion in interpretation. These effects of the Tenth Circuit decision merit the grant of certiorari. If that petition is granted, the *Amici* States will file an *amici curiae* brief on the merits.

Respectfully submitted,

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APPENDIX A

[LOGO]

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

OCT - 9 1998

Honorable Jim Geringer
Governor of Wyoming
Cheyenne, Wyoming 82002

Dear Governor Geringer:

Thank you for your letter of August 3, 1998, cosigned by Senator Craig Thomas, Senator Mike Enzi, and Representative Barbara Cubin, to Secretary of the Interior Bruce Babbitt, regarding the recent en banc ruling by the U.S. Court of Appeals for the Tenth Circuit in *Southern Ute Indian Tribe v. Amoco, et al.*, No. 94-1579. Secretary Babbitt has asked me to respond.

The above-mentioned decision affirmed an earlier decision by a three-judge panel of that court which held that coalbed methane (CBM) is part of the coal reservation in lands conveyed by the United States under the 1909 and 1910 Coal Lands Acts. You request that the Department of the Interior "proceed with CBM leases and production based on current practices under the 1981 Solicitor's Opinion" until the ongoing judicial proceedings in the *Southern Ute* case have ended.

The Department of the Interior does not believe that the recent en banc decision in the *Southern Ute* case affects Federal CBM leasing and production on lands in which the United States owns all the minerals, including CBM,

coal, and natural gas. In these situations, the Bureau of Land Management for some time has been leasing CBM under the "gas" provisions of the Mineral Leasing Act of 1920 (MLA). For the following reason, we believe we can continue this practice without running afoul of the Tenth Circuit decision in the *Southern Ute* case. That case concerned who owned CBM and turned on what Congress intended in the 1909 and 1910 statutes regarding coal reservations. In this situation, on the other hand, there is no question about ownership of the CBM, but only a question of whether CBM should be leased under the "coal" or the "gas" provisions of the MLA. Further, whatever Congress may have intended about CBM in the 1909 and 1910 Acts does not control how CBM should be considered in this different context under the 1920 Act. In particular, we believe the Secretary has sufficient discretion under the MLA to decide to lease CBM under either provision. Therefore, at least until there is further guidance on this question, we will continue our current practice of leasing CBM under the gas provisions of the MLA where the United States owns the entire mineral estate.

On lands where the United States owns only the oil and gas estate, and not the coal estate (specifically, on lands patented under the 1914 Act, 30 U.S.C. §§ 121-123, where the United States reserved only the oil and gas estate), the Department also will continue to lease the lands for oil and gas development. Nevertheless, pending further guidance growing out of the *Southern Ute* litigation, the Department will approve applications for permits to drill (APD) only if the APD does not propose to drill a well to a completion target located in a coal formation. This is because, on these lands, the issue is, as in the *Southern*

Ute litigation, who owns the CBM. Here, the precise question is whether it is to be considered a "gas" reserved to the United States, or part of the coal conveyed away from the United States under the 1914 Act. While it is possible that the courts would construe the 1914 Act to reserve CBM as part of the gas estate and would construe the 1909 and 1910 Acts to reserve CBM as part of the coal estate, the matter requires close study. Pending further analysis and possibly further developments in the litigation, we believe the better course is not to approve any APDs for wells drilled to a completion target located in a coal formation on 1914 Act lands. A comparatively small amount of acreage is possibly affected, so the consequences of a limited and temporary moratorium of this nature do not appear large.

Regarding CBM on lands where the United States has reserved coal under the 1909 and 1910 Acts, but not oil and gas, we are not planning to initiate any action at this time with regard to any ongoing CBM activity that may be taking place under private auspices on such lands. The *Southern Ute* litigation is still pending in the courts. Any decisions based on the Tenth Circuit's ruling require deliberation and consultation with the Department of Justice.

The bureau has previously advised its State and Field Offices, in Instruction Memorandum No. 98-28, to:

> . . . take no action which conflicts with the Tenth Circuit Court Decision. While the decision is still under review, we should refrain from taking any affirmative actions to exercise control over coalbed gas in lands in which the United States owns only the coal estate. In that regard,

you may advise private and State oil and gas lessees and their lessors that development in coalbed gas from federally-owned coal is at their own risk. In the event that private or State oil and gas lessees decide to go forward with coalbed gas development from Federal coal in spite of the Tenth Circuit Court decision, you may inform the State agency responsible for approving and supervising oil and gas development on private and State land leases of our operating standards.

If I can be of further assistance, please do not hesitate to contact me. Identical letters have been sent to Senator Thomas, Senator Enzi, and Representative Cubin.

Sincerely,

/s/ Bob Armstrong
Bob Armstrong
Assistant Secretary, Land and
Minerals Management

[Enjoyed being with you at IOGCC]

Supreme Court, U.S.
FILED
DEC 23 1998
OFFICE OF THE CLERK

No. 98-830

In The

Supreme Court of the United States

October Term, 1998

AMOCO PRODUCTION COMPANY,
on behalf of itself and the class it represents,

Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,

Respondent.

On Petition For Writ Of Certiorari To The United States Court Of Appeals For The Tenth Circuit

AMICUS BRIEF OF INDEPENDENT PETROLEUM ASSOCIATION OF MOUNTAIN STATES IN SUPPORT OF PETITIONERS

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AMICUS CURIAE BRIEF OF THE INDEPENDENT PETROLEUM ASSOCIATION OF MOUNTAIN STATES[1]

IPAMS respectfully submits this *amicus curiae* brief in support of Petitioners, Amoco Production Company, and the class it represents. Pursuant to Supreme Court Rule 37.2, this *amicus curiae* brief is filed with the written consent of the parties.[2]

INTEREST OF THE *AMICUS CURIAE*

IPAMS is a regional trade association representing over 1000 companies and individuals involved in the exploration, development, and production of crude oil and natural gas in the Rocky Mountains and Western United States. IPAMS members are generally smaller companies and "mom and pop" type entities, who operate under close economic margins and for whom the loss of a single project may be devastating. Ownership of natural gas in subsurface coal formations is of critical importance to IPAMS members, many of whom are actively involved in projects targeting this gas.

SUMMARY OF ARGUMENT

The members of IPAMS respectfully entreat this Court to grant the petition for review of the court of

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[1] This brief is authored solely by counsel for *Amicus Curiae* Independent Petroleum Association of Mountain States ("IPAMS").

[2] Copies of the consent letters were concurrently filed with the Clerk of the Court.

appeals' decision, because the decision completely alters the basis upon which coalbed methane gas has been developed for the last twenty years, causing great hardship and economic uncertainty. The appellate court's unprecedented construction of the reservation of "coal" in the Coal Lands Acts of 1909 and 1910, 30 U.S.C. §§ 81, 83-85 ("the Acts"), to include natural gas in coalbeds, ignores the plain meaning of that term, and has far reaching and very negative consequences for thousands of private property owners, oil and gas companies, royalty owners and state and local governments.

ARGUMENT

I. THE CONSEQUENCES OF THE COURT OF APPEALS' RULING ARE DEVASTATING TO PROPERTY OWNERS, PRODUCERS AND STATE AND LOCAL GOVERNMENTS THROUGHOUT THE WESTERN UNITED STATES.

In the decision, the court of appeals rejects the long-standing statutory construction of the U.S. Department of Interior ("DOI"), that under the Acts, natural gas in coalbeds was conveyed to homesteaders the same as gas in any other subsurface formation. *Ownership of and Right to Extract Coalbed Gas in Federal Coal Deposits*, 88 I.D. 538 (1981) ("Solicitor's Opinion"). By overturning the Solicitor's Opinion, the court of appeals fashioned a decision that not only bestows a windfall on the Southern Ute Indian Tribe, but also creates enormous harm and displacement of property ownership interests for citizens far beyond the Tribe's Reservation in southwestern Colorado.

This case is not a question of Indian law. Rather, it is an issue of title to natural gas located in coalbeds and whether such gas was conveyed or reserved under the Acts. The DOI seemingly resolved this question almost twenty years ago in an opinion that producers were required to follow in order to develop these gas resources. Under the Acts, there are two possible owners of title to the gas still located in coalbeds: (1) the homestead patentees and their successors who were conveyed the surface and all other minerals, including oil and natural gas; or (2) the U.S. government and its successors who reserved "coal". Once the government, through the Solicitor's Opinion, determined ownership of this gas, producers could proceed to obtain leases in order to develop it. And so they have, with an estimated 7000 coalbed methane gas wells completed through 1996, proving up billions of dollars of reserves of natural gas. *See* Potential Gas Committee, Colorado School of Mines, *Potential Supply of Natural Gas in the United States* (1997), p. 11 and Table 2. The majority of this gas has not yet been found, however, and significant capital resources are being directed towards its recovery. Experts estimate total reserves in western basins to be over 132 trillion cubic feet. *Id.* This case, which completely reverses the basis upon which coalbed gas has been developed, has stopped exploration activity in its tracks and saddled producers with real economic calamity. Now, if title to the lands believed to contain coal gas originates under the Acts, ownership of that resource is no longer definitively known.

A. Marketable Title Is No Longer Obtainable For Gas Underlying 20 Million Acres of Western Lands.

Pursuant to the Acts, more than 16 million acres of public lands have been conveyed by patents from the

Federal Government to private parties. DOI *Public Land Statistics* 54-55 (1997). Patents issued under the Acts cover lands in 17 states, with the majority located in the coal rich Rocky Mountain Region. *Id.* Typically no more than 160 acres each, these patents were received by more than 100,000 private parties whose heirs now number several times that figure. To date, companies have secured title for drilling and producing gas from coalbeds, by leasing rights to explore for oil and gas from the patent holder chain of title. Producers made these investment decisions in reliance upon the plain meaning of the word "coal", oil and gas practice and the Solicitor's Opinion. Under the appellate court's analysis however, "coal" includes this gas and thousands of producers are now deemed to have leased from the wrong lessor. An additional 4 million acres of property rights conveyed under the 1914 Act, 30 U.S.C. § 121, wherein the Federal Government reserved only "oil and gas", are also impacted. Under the decision, federal oil and gas leases issued pursuant to this reservation, would no longer authorize recovery of gas from coal formations. The loss of 20 million acres of property interests is catastrophic for past and pending mineral development.

The court of appeals' decision has destroyed, or at the very least clouded, title to all of the natural gas sourced in coal underlying 20 million acres of land. As a result, exploration and development of this resource cannot continue. A fundamental pre-requisite to any exploration program is acquiring marketable title to the targeted resource. Marketable title is one which is "free from reasonable doubt" and will not expose the party who

holds it to the "hazards of litigation" or duplicative payments. Lewis G. Mosburg Jr., *Handbook on Petroleum Land Titles* § 104, pp. 5-6 (1981); *Wilson v. Elliott*, 589 N.E.2d 259, 261 (Ind. App. 1992); *Knight v. Devonshire Co.*, 736 P.2d 1223, 1225 (Colo. App. 1986). The marketable title standard is used throughout the industry by operators and pipeline purchasers as the basis for allocating and distributing production revenues and royalties.[3] Mineral title examiners require this standard to ensure lawful operations, free from claims of trespass or third party ownership. Likewise, energy lenders base capitalization and financing decisions on the amount of reserves that a company owns. To collateralize reserves, marketable title must again be adequately demonstrated. The court of appeals' decision has raised the spectre that a company's investment in coal gas assets may now be lost.

The economic consequences for property owners who entered into leases for oil and gas development are catastrophic. These lessors (and their lessees), have effectively been disenfranchised from their property. For many of these individuals, the loss of monthly income from royalty checks is devastating. Calculation of these losses is compounded by the ripple effects occurring throughout the rural economies where this gas is located

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[3] *See, e.g., Hull v. Sun Refining and Marketing Co.*, 789 P.2d 1272, 1277 (Okla.1989) (suspension of royalty payments proper where marketable title in doubt); 33 Rocky Mtn. Min. L. Inst. 17, *First Purchaser Suspense Accounts* § 17.04[2][a] (1988) (suspending proceeds from production should always be required "when the mineral fee or leasehold title is clouded of record in such a manner that the first purchaser might be placed at risk for double or improper payments.")

and whose citizens depend upon oil and gas revenues and severance taxes to fund schools, roads and other public works.

Numerous successful projects completed far outside the Southern Ute Reservation in areas such as the Powder River Basin of Wyoming and the Raton Basin of Southern Colorado, were done on the basis of leasing decisions in accordance with the Solicitor's Opinion. Now producers find themselves in an untenable situation. Past projects have been rendered unsound, no matter how successful, by the possibility of third party claims of trespass and disgorgement of previously distributed revenues. Federal tax credits taken for past coal gas drilling activities may be retroactively invalidated. 26 U.S.C. § 29. To producers, the result is the same as "bait and switch" tactics, since these tax incentives were specifically created by Congress to encourage exploration for coalbed methane gas between 1980 and 1992. By relying upon the federal tax incentives and the Solicitor's Opinion, producers now face economic peril.

B. Many Independents Face Severe Losses From Investments In Future Projects That Are No Longer Economically Sound.

Currently, absolutely no mechanism exists for leasing natural gas in coalbeds where the government now allegedly holds title to that gas based upon the court of appeals' decision. Since the decision, the DOI has abstained from participation in this lawsuit and has issued Instruction Memorandum No. 98-28, advising DOI

employees to take no action on lands involving coalbed methane gas. Numerous pending exploration projects are on hold for the foreseeable future because title to the gas through the government's coal ownership cannot be obtained. Although Congress quickly passed the so-called Enzi Act, P.L. No. 105-367, § 1(a), 112 Stat. 3313 (1998), its impact is limited to existing leases. The Enzi Act permits those projects to proceed, not because it resolves *title* to the gas, but because it provides that the government will make no claim for production revenues generated from existing leases. The Act does nothing to prevent other third parties from suing producers, lessors or local governments.

Nor does the Enzi Act resolve the marketable title crisis created by the decision. Many huge areas of the western coal basins have not been leased yet, so the Enzi Act is inapplicable to those lands. They remain closed for the foreseeable future. Only those projects which were about to be drilled and for which a producer had already obtained all necessary leases will benefit from this Act. In many cases, the legislation creates new difficulties because only a fraction of the 100% interest in the gas under a tract of land will be grandfathered in under the Act, resulting in split estates between the government and patent holders. This puts producers in the worst possible situation since the private leases will expire if drilling cannot proceed. If a producer elects to carry the federal interest and go ahead with drilling a well, it may not be able later to obtain the federal interest, or may have to pay enormous sums to obtain it, completely altering the economics of the well. Therefore a real risk exists that the producer would be discovering reserves for

someone else with its investment dollars. This confusion will foster title busting and speculation for years to come, as well as spawning endless litigation pitting neighbor against neighbor and neighbor against the government.

C. The New Scheme Which Gives Coal Owners Rights To The Gas Is Unworkable As A Matter Of Oil And Gas Practice.

The court of appeal's construction of the reservation of "coal" under the Acts is erroneous because it is based upon the misconception that natural gas in coal is somehow coal and not gas for all practical purposes. It is not. Coalbed gas has the same composition as natural gas found in other geologic formations. All natural gas originates from either shales or coals. Over time, much of the gas migrates to surrounding sand and limestone formations where it is trapped with oil and water. Some of the gas remains in the shale or coal. In the case of shale, the gas whether migrated or not, is still considered gas. The same conclusion should apply to gas located in coal.

The artificial distinction drawn by the appellate court, between gas still in the coal seam (deemed coal), and gas originating in the coal seam but which has migrated to adjacent sandstones (deemed natural gas), is unworkable in practice and results in unnecessary expense and waste of recoverable gas. This waste of valuable natural resources contradicts the very purpose of every regulatory scheme devoted to oil and gas

conservation and development.[4] Where drilling activity reveals the presence of gas in both types of formations, duplicative leases from both owners would be required to ensure lawful operations. The drilling of duplicative wells, one to produce gas remaining in the coal and one to produce the gas which has migrated into adjacent geological formations, could also be required. Further, it may be extremely difficult for producers to identify the source of the gas at the surface. This legal fiction creates tremendous hardships for the thousands of producers and mineral owners who relied upon the Solicitor's Opinion. The results oriented decision fashioned here will generate title losses, waste and litigation for many years to come.

CONCLUSION

At stake here is the statutory construction of important public lands statutes affecting ownership of natural gas in coal under more than 20 million acres of western lands. Given the far reaching negative consequences of the court of appeal's decision to property owners, producers, and state and local governments, IPAMS

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[4] *See, e.g.* Wyo. Stat. Ann. § 30-5-102 (1998) (In Wyoming, the waste of oil and gas by inefficient, excessive or improper recovery is expressly prohibited); 43 C.F.R. § 3161.2 (1998) (DOI requires that all oil and gas operations be conducted in a manner which protects natural resources and "results in the maximum ultimate recovery of oil and gas with minimum waste.")

respectfully requests the Court grant a writ of certiorari in this case.

Respectfully submitted,

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No. 98-830

Supreme Court, U.S.
FILED
DEC 23 1998
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IN THE

Supreme Court of the United States

OCTOBER TERM, 1998

AMOCO PRODUCTION COMPANY, on behalf of itself and the class it represents,

Petitioners,

vs.

SOUTHERN UTE INDIAN TRIBE,

Respondent.

ON PETITION FOR WRIT OF CERTIORARI
TO THE UNITED STATES COURT OF APPEALS
FOR THE TENTH CIRCUIT

BRIEF OF *AMICI CURIAE* THE COAL BED METHANE AD HOC COMMITTEE, THE WYOMING INDEPENDENT PRODUCERS' ASSOCIATION AND THE INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA IN SUPPORT OF PETITIONERS

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29 pp

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INTEREST OF *AMICI CURIAE*

The Coal Bed Methane Ad Hoc Committee ("the Committee"), the Wyoming Independent Producers' Association ("WIPA"), and the Independent Petroleum Association of America ("IPAA") file this brief *amici curiae* in support of petitioner Amoco Production Company ("Amoco").[1] The decision below reopens a question previously settled by the Department of the Interior: Under 30 U.S.C. §§ 81-85, when Congress reserved "coal" to the federal government from the remaining fee simple estate patented to citizens and States, did it also reserve the natural gas known as coal bed methane?

The Committee is comprised of Wyoming landowners and oil and gas companies. The Committee's efforts are also supported by other landowners, a local bank, and a pipeline company. All are directly interested in the development of the coal bed methane resources in the Powder River play in northern Wyoming, a play that may contain 40 trillion cubic feet of natural gas. (Petitioners' Appendix ("Pet. App.") 181a.) The landowners hold patents, subject to the reservation of "coal" under 30 U.S.C. §§ 81-85, issued by the Department of the Interior under various statutes disposing of the public lands to encourage the settlement and cultivation of our western States. The oil and gas companies have received oil and gas leases from these and other landowners. The companies will need to obtain additional leases as their knowledge of the geology of

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1. The parties have consented in writing to the filing of this brief. Their letters have been filed with the Clerk of the Court. Counsel for the parties did not write any part of this brief; the undersigned counsel is its sole author. Persons other than the *amici curiae* or their members who made a monetary contribution to the preparation of the brief are listed in Appendix A at the end of this brief. The members of the Committee are also identified in Appendix A.

the play expands. The bank has loaned funds for development of coal bed methane leases on the assumption that title to the gas rested with Wyoming land owners, not with the federal government and its successors in interest. The pipeline company has announced its plan to build a 24-inch gas pipeline to transport the projected high volumes of coal bed methane production from the Powder River Basin.

WIPA and IPAA represent, on a state and national level respectively, thousands of independent producers of natural gas and oil on all issues affecting their members' interests. The decision below has created a cloud over the title to coal bed methane in a vast area of the country. Relying on certain governmental statistics which may be incompletely compiled, Amoco has estimated that approximately 20 million acres of land are affected by the decision. (Pet. 24 n.13.) Precision is impossible without hundreds of thousands of title examinations, but the estimate may be low. Between the start of President Roosevelt's coal-land withdrawals in 1906 and the passage of the Mineral Leasing Act of 1920, 30 U.S.C. § 181 *et seq.*, the Land Classification Board of the United States Geological Survey ("USGS") reviewed approximately 144 million acres of withdrawals of potential coal lands in thirteen western states, finding that 30.3 million acres qualified as coal lands, 74.8 million acres did not, and the 39.9 million acres still pending review in 1920 were left unclassified because the Mineral Leasing Act rendered coal-lands classification moot. 41st ANNUAL REPORT OF THE DIRECTOR, USGS, TO THE SECRETARY OF THE INTERIOR 145-46 (1920). As explained more fully below, patents under the statutes at issue could have been granted on any of these withdrawn lands. WIPA's and IPAA's members are vitally interested in resolving the doubts created by the decision below so that they may proceed with the development of potentially tens of trillions of cubic feet of coal bed methane resources. (Pet. App. 181a.)

To facilitate the development of this largely untapped resource, the United States Department of the Interior published a formal opinion in 1981, addressing the effect of the reservation of "coal" under the two statutes at issue here: an Act of March 3, 1909, 35 Stat. 844 ("the 1909 Act") and an Act of June 22, 1910, 36 Stat. 584 ("the 1910 Act"). After careful analysis, the Solicitor concluded that "coalbed gas was not reserved with federal coal in nonmineral patents issued subject to the 1909 and 1910 Acts." (Pet. App. 150a.)

In reliance on that opinion, the Committee's members and other landowners, banks, and businesses entered into oil and gas leases, obtained drilling and environmental permits, secured loans, and commenced the exploration and development of coal bed methane resources. These resources underlie some of the 22 million acres of potential coal lands in Wyoming once withdrawn by the Roosevelt Administration ninety years ago. 35th ANNUAL REPORT OF THE DIRECTOR, USGS, TO THE SECRETARY OF THE INTERIOR 132 (1914). Within the last three years, 2,250 coal bed methane wells have been drilled or permitted in Campbell County, Wyoming, alone. In the last eighteen months, the Federal Energy Regulatory Commission has issued a series of orders authorizing additional pipeline facilities within Wyoming to accommodate the anticipated increase in production. *Wyoming Interstate Company, Ltd.*, 84 FERC ¶ 61,007 (1998); *MIGC, Inc.*, 84 FERC ¶ 61,009 (1998); *MIGC, Inc.*, 79 FERC ¶ 62,135 (1997).

In response to the decision below, and at the urging of these *amici*, the 105th Congress enacted S. 2500, Pub. L. No. 105-367, 112 Stat. 3313 (1998). The basic purpose of the bill is to protect investments in existing coal bed methane leases and in certain exploration and development activities already under permit by landowners on their own unleased lands. *Id.* § 1. These provisions disavow federal claims to certain "coalbed methane

production" described in the legislation, but do not otherwise waive claims of title the government may have resulting from the Tenth Circuit's interpretation in the decision below. *Id.* § 1(b)(5). The provisions do not benefit leases issued after the date of enactment, November 10, 1998, including a lease needed because of the lapse of a pre-Act lease. *Id.* § 1(b)(1). Nor do they affect in any way title to coal bed methane with respect to lands in which the reserved federal coal estate or reserved federal oil and gas estate has been transferred to third parties. *Id.* § 1(b)(3) & (4).

Congress enacted S. 2500 with its sponsors' hope that this Court would issue a writ of certiorari to address "the potentially disastrous effects of the [Tenth Circuit] Court's ruling. . . ." 144 CONG. REC. H10939 (daily ed. Oct. 15, 1998) (remarks of Rep. Rahall). These effects are already being felt by these *amici* and their supporters. The landowners can issue no new leases. Indeed, they cannot even re-lease their land upon the lapse of a current lease. Nor can they drill on their own land if they lack a state drilling permit based on a pre-Act application specifically targeting "a coal formation." Pub. L. 105-367 § 1(a)(2). The oil and gas companies have stopped obtaining new leases because of the uncertainty over title. As a result, their evolving plans to expand the exploration and development of the play are stymied. The pipeline faces the significant new risk that, because of slowed or curtailed development, oil and gas producers will not be able to keep the pipeline full of gas for shipment over time, thus impairing the profitability of the venture. Going forward, all three groups face the highly speculative task of sorting out, for title and royalty purposes, the coal bed methane from all other methane to be produced. (Pet. App. 63a n.7.)

The decision below violates the statutes under which the predecessors of the Committee's landowners — and hundreds

of thousands of like-situated holders of federal patents — were encouraged to settle our western States. The decision largely nationalizes a previously privately-owned mineral right, unfairly depriving the owners of one of the rights they *earned* and own under the patents. Furthermore, the Nation's energy and environmental strategies call for increased reliance over the long term on natural gas. The uncertainty created by the decision below impedes the pursuit of those strategies. The Committee, WIPA, and IPAA therefore urge the Court to grant Amoco's petition and reverse the Tenth Circuit's rejection of the well-reasoned position of the Department of the Interior that the reservation of "coal" in federal land patents did not reserve title to methane associated with the coal.

SUMMARY OF ARGUMENT

The court of appeals found Congress' intent "ambiguous" as to whether coal bed methane was included in the reservation of "coal" in the 1909 and 1910 Acts. (Pet. App. 8a-9a.) The court admitted "Congress' awareness [in 1909] that CBM [coal bed methane] was released as a hazardous byproduct of coal mining" (Pet. App. 20a) and the "fact that CBM could not be commercially extracted from coal in 1909. . . ." (Pet. App. 21a.) The court even quoted with approval the observation of the Pennsylvania Supreme Court that, despite their proximity in coal seams, "[c]oal and coalbed gas are, nevertheless, separate physical entities." (Pet. App. 22a.)

The court of appeals' concessions make its ruling indefensible. The history surrounding the enactment of the 1909 and 1910 Acts demonstrates that persons *and States, see State of Utah*, 38 Pub. Lands Dec. 245 (1909) (selections by state subject to coal reservation), receiving patents subject to their provisions received full title to the land save only for the one mineral the land was deemed "valuable for:" coal. 30 U.S.C.

§§ 81, 83 & 85. All other minerals which, at the time the patent issued, the land was not thought "valuable for" passed to the patentee along with the rights to the surface. Indeed, even known deposits of coal continued to be patented without reservation because the deposits were not "valuable" enough. Plainly, lands patented subject to these two Acts were not deemed valuable for coal bed methane. Therefore, other than the reservation of the coal itself, patentees under these Acts were "entitled to a patent without reservation. . . ." *Circular*, 38 Pub. Lands Dec. 183, 184 (1909) (construing Act of March 3, 1909).

Furthermore, even if the term "coal" could be found ambiguous, the court of appeals was wrong not to defer to the views of the Department of the Interior. The court's refusal not only raises a serious question under *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984), as Amoco's petition ably shows (Pet. 21-23), but also demonstrates disregard for this Court's longstanding deference "to decisions of the Land Department," *United States v. Hammers*, 221 U.S. 220, 225-26 (1911), in construing the public land laws. When faced with ambiguity in those laws, as this Court has indicated, "we must turn as a help to its meaning, *indeed, in such case, as determining its meaning*, to the practice of the officers whose duty it was to construe and administer [them]." *Id.* at 228 (emphasis added). *See also Burke v. Southern Pacific RR Co.*, 234 U.S. 669, 677-78 (1914) (the "administration of these [public land] laws has rested with the Land Department, and therefore its course of action . . . requires to be noticed"). A chief goal of this policy of deference toward the Interior Department has always been to promote certainty of land titles resulting from the disposal of public lands. *Barden v. Northern Pacific RR Co.*, 154 U.S. 288, 326 (1894). It is thus with irony and error that the Tenth Circuit disregarded the contemporaneous deference principle familiar to the very Congress enacting the statutes at issue.

Because the ruling below has cast a cloud over title to extensive coal bed methane resources under tens of millions of acres of lands currently or imminently under development in the West, this Court's immediate correction is required.

ARGUMENT

I.

THE 1909 AND 1910 ACTS DID NOT RESERVE TO THE GOVERNMENT THE METHANE IN COAL SEAMS

As it should, the Tenth Circuit acknowledged that the task before it was one of effecting "the will of Congress. . . ." (Pet. App. 10a, quoting *Griffin v. Oceanic Contractors, Inc.*, 458 U.S. 564, 570 (1982)). Noting that Congress did not expressly mention coal bed methane in the 1909 and 1910 Acts, however, the Tenth Circuit framed the issue before it with beguiling finesse. Invoking the interpretive guideline that "land grants are construed favorably to the Government" and "that nothing passes except what is conveyed in clear language," (Pet. App. 11a quoting *Watt v. Western Nuclear, Inc.*, 462 U.S. 36, 59 (1983)), the court placed the "burden" upon Amoco "to dispel any ambiguity in the construction of the coal reservation." (*Id.*) Finding at each opportunity that the Acts were ambiguous as to whether coal included methane associated with the coal (Pet. App. 14a-24a, 27a-30a), the court found no clear language conveying the coal bed methane to the patentees. "Rather," the court concluded, "where the commercial value of CBM was unappreciated at the time of the enactment, the texts of these acts gives us no particular indication" of Congress' intent. (Pet. App. 21a.)

Even the briefest history of public land law between the Civil War and World War I shows that the court has stood Congress' intent in passing the 1909 and 1910 Acts on its head. From the Civil War to the turn of the century, the general policy of the United States was to encourage the settlement and improvement of the western states by granting patents — full fee simple title — to persons developing the public lands for the various purposes specified by statute. The homestead law entitled citizens to enter quarter-sections of "unappropriated public lands," 43 U.S.C. § 161, "for the purpose of actual settlement and cultivation. . . ." 43 U.S.C. § 162. Similarly, the desert-land law gave citizens the right to enter one-half sections of "desert land" and obtain patents to them upon undertaking "the necessary irrigation, reclamation, and cultivation thereof. . . ." 43 U.S.C. §§ 321 & 328.

Generally, lands known to be valuable for certain minerals could not be entered and patented under the homestead and desert land laws, but instead were available for purchase in fee simple under other statutes. *See Watt v. Western Nuclear, Inc.*, 462 U.S. 36, 47-48 (1983) (explaining former land classification system). For example, "tracts embracing coal-beds or coal-fields" with "known mines" were unavailable for private entry under the non-mineral land laws. *Colorado Coal & Iron Co. v. United States*, 123 U.S. 307, 324-25 (1887). However, Congress was well-aware that entrymen obtaining their patents under the public land laws nevertheless received mineral rights which might well become highly valuable in the future. Whether lands were valuable for minerals was to "be determined according to the facts in existence at the time" the patent issued. *Id.* at 328. "A change in the conditions . . . whereby new discoveries are made . . . cannot affect the title as it passed. . . ." *Id.*

By the time Congress considered the 1909 and 1910 Acts, therefore, it was well-known that the grant of full fee patents

to entrymen, which included mineral rights that could prove valuable in the future, was the key to the national plan "to induce settlement, cultivation, and the establishment of homes upon the public lands." *Ware v. United States*, 154 F. 577, 584 (8th Cir. 1907). The accepted rule of construction was "that the statutes should not be construed strictly and harshly against the homesteader, but that the land laws should be administered liberally to fulfill their purpose," *United States v. Mills*, 190 F. 513, 521 (5th Cir. 1911), a rule of construction made particularly apt by Congress' decision to provide special homesteading rights to veterans of the Union army. *See generally Anderson v. Clune*, 269 U.S. 140 (1925) (discussing soldiers' additional homestead rights). *Accord Shiver v. United States*, 159 U.S. 491 (1895) (contrary to the literal interpretation of the statutes, the Court holds that entrymen had a right to cut timber needed to establish a homestead). The rule of liberal construction also reflected that, like railroad land grants, homestead and desert-land patents were not gifts from the federal sovereign, but instead were the *quid pro quo* for years of labor and investment by entrymen. In other words, an entryman "*earned* the right to the lands described" in the patent. *Burke*, 234 U.S. at 680 (emphasis added).

It was against this backdrop that President Theodore Roosevelt approached problems his advisors perceived in the public land laws, especially as to coal lands. Believing that those laws inhibited the scientific management of vital resources such as water power, timber, forage, and minerals, President Roosevelt appointed a Public Lands Commission on October 22, 1903, to report on revisions. S. Hayes, CONSERVATION AND THE GOSPEL OF EFFICIENCY: THE PROGRESSIVE CONSERVATION MOVEMENT, 1890-1920 at 67 (1975). The Commission's first "partial report," issued in March 1904, alleged that "abuses" permeated the administration of the land laws and that the structure of the laws themselves often thwarted congressional

goals. S. Doc. No. 189, 58th Cong., 3d Sess., "Report of the Public Lands Commission" vi-vii & viii (1905) ("Commission Report"). Its second "partial report" in February 1905 urged that "the first essential for putting the remaining public lands to their best use is to ascertain what that best use is by a preliminary study and classification of them. . . ." Commission Report xiv.

Dissatisfied by congressional inaction on his Commission's report, President Roosevelt seized upon the allegations of fraud to further his agenda of more efficient use and federal management of the public lands. In a December 17, 1906, message to the Congress, Roosevelt explained that he had earlier that year directed the Secretary of the Interior "to allow no patent to be issued to public land under any law until by an examination on the ground actual compliance with that law has been found to exist." S. Doc. No. 141, 59th Cong., 2d Sess. 2 (1906) ("S. Doc. No. 141"). Also that year Roosevelt "withdrew approximately 64 million acres of lands thought to contain coal from all forms of entry. . . ." *Watt v. Western Nuclear, Inc.*, 462 U.S. 36, 48-49 (1983). The withdrawals were modified on the date of the President's message, *Conway v. Brooks*, 39 Pub. Lands Dec. 337, 339 (1910), to permit "agricultural entries . . . within a withdrawn area." *Instructions*, 40 Pub. Lands Dec. 418, 419 (1912). Entrymen received notice of the withdrawals by notations in the tract books of local land offices that the lands were "coal lands," *Instructions*, 35 Pub. Lands Dec. 681 (1907), pending final classification of the land by the USGS. *Nelson J. Littlejohn*, 44 Pub. Lands Dec. 48, 52 (1915).

Some entrymen, then, had entered before the withdrawals; others after. "In both instances, under the state of the laws then in force, the nonmineral claimant must have lost had the land ultimately been determined to be valuable for the coal deposits."

Instructions, 40 Pub. Lands Dec. at 419. President Roosevelt had no intention, however, of making these lands available for patent under the coal land laws either.

> The present coal law limiting the individual entry to 160 acres puts a premium on fraud by making it impossible to develop certain types of coal fields and yet comply with the law. It is a scandal to maintain laws which sound well, but which make fraud the key without which great natural resources must remain closed. The law should give individuals and corporations under proper government regulation and control . . . the right to work bodies of coal land large enough for profitable development. My own belief is that there should be provision for leasing coal, oil, and gas rights under proper restrictions.

S. Doc. No. 141 at 2. Congress was not yet prepared, however, to abandon the policy of encouraging development by placing publicly-owned resources into private hands, and another fourteen years would pass before the Mineral Lands Leasing Act of 1920 would turn President Roosevelt's "own belief" into statutory form.

In the meantime, opposition to the land withdrawals grew as frustrated entrymen found their homestead and desert land entries in limbo. But the withdrawals continued. Between July 1909 and June 1911 an additional 57 million acres of potential coal lands were withdrawn pending classification. 31ST ANNUAL REPORT OF THE DIRECTOR, USGS, TO THE SECRETARY OF THE INTERIOR 46 (1910); 32ND ANNUAL REPORT OF THE DIRECTOR, USGS, TO THE SECRETARY OF THE INTERIOR 65 (1911). Eventually withdrawals exceeded 140 million acres. President Roosevelt created within the USGS a Land Classification Board to, among

other tasks, permanently classify lands chiefly valuable for coal. Because lands so classified could only be available under the coal land laws (which Roosevelt hoped to amend), the Board received numerous requests to "de-classify" withdrawn lands. 34TH ANNUAL REPORT OF THE DIRECTOR, USGS, TO THE SECRETARY OF THE INTERIOR 149 (1913) (236 requests between 1909-13).

His state severely affected by Roosevelt's initial withdrawals, *see* S. REP. NO. 61-703, at 2 (1910) (discussing coal lands in Wyoming), Representative Mondell of Wyoming secured a legislative compromise. In general, the solution was to permit nonmineral entries to proceed to patent, subject only to the government's reservation of the "coal" and the right to mine it. Congress rejected proposals to reserve natural gas and other minerals, allowing rights to those minerals to pass to the patentee. (Pet. App. 146a-147a.)

More specifically, under the 1909 and 1910 Acts, entrymen were given an election. On the one hand, "[b]ecause of the considerable time involved in the actual classification of the lands, the Act[s] allowed the claimant to elect to receive a patent with a coal reservation." *Walter & Margaret Bales Mineral Trust*, 84 IBLA 29, 33 (1984). On the other hand, they could contest the preliminary classification of the withdrawn land. If they accepted the reservation, "no further inquiry [was] necessary respecting the coal character of the land." *Circular*, 38 Pub. Lands Dec. at 184. If they contested it, the process proceeded to the "taking of the final proof. . . ." *Id.* Those contestants were entitled under the 1909 Act to a "patent without reservation unless at the time of such final proof and entry it shall be shown that the land is chiefly valuable for coal," (Pet. App. 133a), and under the 1910 Act to "disprov[e] such [coal-lands] classification. . . ." (Pet. App. 135a-136a.) An unsuccessful contestant still was entitled to a patent, but subject to the reservation of coal. Some contested the withdrawals and

classifications, *e.g.*, *Ada I. Hindman*, 42 Pub. Lands Dec. 327 (1913); some did not.

Quite apart from the errors which Amoco's petition has already identified, this history shows the error of the Tenth Circuit's mechanical use of the presumption construing land grants in favor of the government grantor. *See Leo Sheep Co. v. United States*, 440 U.S. 668, 682-83 (1979) (harmonizing rules of interpreting public lands statutes). That presumption is simply one of many tools in divining congressional intent under the public land laws. And it has long been the rule that courts construing those laws must consider "the condition of the country when the acts were passed, as well as . . . the purpose declared on their face, and read all parts of them together." *Winona & St. Peter RR Co. v. Barney*, 113 U.S. 618, 625 (1885). Over all these considerations, however, lies the policy that public land laws inducing private citizens and corporations to undertake work and investment on the "immense and undeveloped public domain" are to receive "a more liberal construction" than that suggested by the rule "that public grants are construed strictly against the grantees. . . ." *United States v. Denver & Rio Grande RR Co.*, 150 U.S. 1, 14 (1893).

Here the "condition of the country when the [1909 and 1910] acts were passed" was one in which the nation had not yet moved to a policy of reserving rights to all minerals for later leasing, as it later did in the Stock-Raising Homestead Act of 1916 ("SRHA"). *See Watt v. Western Nuclear, Inc.*, 462 U.S. at 37. The 1909 and 1910 Acts were the first *"limited"* step in that direction (Pet. App. 147a (House colloquy) (emphasis added)), with the general rule remaining that all minerals the land was not "valuable for" were to pass to the patentee. As the Tenth Circuit recognized, the coal bed methane is distinct from the coal, Congress was aware that it existed and posed a threat to safe coal mining, and in 1909-10 the

methane was not forseeably producible. Therefore, the "more liberal construction" of intent compels the very opposite of the result the court of appeals reached under the presumption against the grantee. If Congress had intended to reserve minerals the land was not "valuable for," it would have done so expressly.

This case, then, is at the opposite end of the interpretive spectrum from *Watt v. Western Nuclear, Inc.*, where this Court invoked the presumption against federal land patentees — not, we would note, as the starting point of its review, but only after exhausting other tools of interpretation, including extensive analysis of Interior Department precedents. 462 U.S. at 59-60. The crucial difference in the cases is the differing contexts in which the SRHA and the 1909 and 1910 Acts were adopted, as this Court aptly explained.

> Unlike the preceding statutes containing mineral reservations, the SRHA was not limited to lands classified as mineral in character, and it did not reserve only specifically identified minerals.

Id. at 49.

The court of appeals made one attempt to be responsive to this distinction. It stated that the 1909 and 1910 Acts did not just reserve coal that could be, as of the date of enactment, mined economically. Instead, in the court's view, Congress reserved "all the coal." (Pet. App. 29a.) From this the court drew a sweeping inference.

> Congress knew there was indeterminate potential value in the reserved coal and intended to secure that value for the United States. Rather than indicating a limited reservation of coal to the United States, the legislative history suggests that Congress adopted an interpretation of coal which encompassed both the present and future economic value of coal for energy purposes, including value that could only be realized through advances in technology such as those which drive the present day exploration for CBM.

(Pet. App. 30a.)

As history and the statutory text disclose, however, the court significantly overstated what Congress reserved. The 1909 and 1910 Acts did not reserve all coal on federal lands. Instead, as to public lands "classified, claimed or reported as being valuable for coal" and public lands "withdrawn or classified as coal lands, or . . . valuable for coal . . . ," (Pet. App. 133a, 134a), they gave the "locator, selector, or entryman" the option of accepting a patent with a coal reservation or contesting whether the land in question was "chiefly valuable for coal" or otherwise "disproving such [coal lands] classification." (Pet. App. 133a, 136a.) Secretary Ballinger's 1909 regulations for the classification of coal lands made it evident that many lands with abundant coal deposits which were too deep for mining in that day were to be classified as "noncoal land." (Pet. App. 137a-139a.) Implementation of those regulations by USGS was expressly based on the view that coal lands were those where "coal can be commercially mined." 34TH ANNUAL REPORT OF THE DIRECTOR, USGS, TO THE SECRETARY OF THE INTERIOR 145-46 (1913). "[I]n determining whether a tract [was or was] not coal land the Department [was] guided by its coal classification regulations as to the workability of a deposit of coal occurring on such tract." *Nelson J. Littlejohn*, 44 Pub. Lands Dec. at 52.

In short, Congress reserved coal only on lands "chiefly" valuable for coal. (Pet. App. 133a.) Congress knew that rights even to known deposits of hardrock coal would continue to

pass to patentees under the 1909 and 1910 Acts, because those deposits were not valuable enough to be "chiefly valuable." *See, e.g., Ada I. Hindman*, 42 Pub. Lands Dec. at 329 (granting full patent without coal reservation despite ex parte affidavit from General Land Office "practical miner" that tract contained a "workable deposit" of coal). Congress did *not* follow a policy of reserving rights to coal of merely "indeterminate potential value." (Pet. App. 30a.) History, therefore, undermines the Tenth Circuit's inference that Congress intended to reserve rights to coal bed methane which, at the time, appeared to lack even potential value.

II.

SECURITY AND CERTAINTY OF LAND TITLES COMPEL DEFERENCE TO THE 1981 SOLICITOR'S OPINION

Modern deference principles give special weight to the views of agencies tasked with the administration of frequently complex legislation. Those views need not be expressed in legislative rules to receive a court's deference, but can be presented in less formal ways, as Amoco has explained. (Pet. 21); *see also Martin v. Occupational Safety & Health Review Comm'n*, 499 U.S. 144, 157 (1991) (administrative litigation positions and interpretive rules). Modern deference under *Chevron* is founded on the perception that an agency's "expertise and experience with related statutes make it better able [than a court] to fit statutes with one another or to coordinate seemingly inconsistent enactments." Cass R. Sunstein, *Law and Administration after Chevron*, 90 COLUM. L. REV. 2071, 2116 (1990). The 1981 Solicitor's Opinion on coal bed methane is a perfect example of the application of that expertise and experience, drawing as it did on the scientific expertise of the Department's bureaus (*see also* Pet. App. 164a-166a) as well as the Department's long experience in administering the statutes analyzed. Amoco has correctly invited the Court to use this agency opinion as a means to address a split in the circuits on the scope of agency interpretive action to which deference is owed.

Chevron, to be sure, was a landmark; but it was not a revelation. It synthesized earlier strands of deference doctrine. Among the oldest of these is one highly relevant to this case and extremely important to these *amici*: the deference owed to the decisions of the Department of the Interior on interpretations of the public land laws. *United States v. Hammers*, 221 U.S. at 228. That deference is founded in part on the Department's familiarity with those laws, a familiarity almost always starting with the bills prior to their enactment and continuing into their day-to-day administration. But it is also founded on a consideration unique to the Department's administration of laws governing interests in real property: certainty of title.

> It is conceded to be of the utmost importance to the prosperity of the country that titles to land, and to minerals in them, shall be settled, and not be the subject of constant and ever-recurring disputes and litigation, to the disturbance of individuals, and the annoyance of the public. . . . The law places under the supervision of the [I]nterior [D]epartment . . . the control of all matters affecting the disposition of the public lands of the United States, and the adjustment of private claims to them under the legislation of [C]ongress.

Barden v. Northern Pacific RR Co., 154 U.S. 288, 326 (1894).

Here the Tenth Circuit's rejection of both the 1981 Solicitor's Opinion and the Department's consistent compliance

with that opinion is not only what is wrong with the court's opinion, it is also the very reason why certiorari is warranted at this time. The lack of deference has unsettled title to mineral rights in a vast area of the nation, to the disturbance of many tens of thousands of landowners, and to the disruption of the future development of methane resources in Wyoming and elsewhere. Deference to the Department assures consistent interpretation of the laws around the country.

In the final analysis, then, this Court can take comfort in knowing that the Solicitor's Opinion was right. But at this late date, what is perhaps more important is that, under the Solicitor's Opinion, the issue was settled.

CONCLUSION

Amici urge that the Court grant Amoco's petition for writ of certiorari.

Respectfully submitted,

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APPENDIX

APPENDIX A — IDENTIFICATION OF INTERESTED PARTIES

The members of the Coal Bed Methane Ad Hoe Committee are as follows:

Karen Kennedy, Chairman (WIPA)
Barrett Resources, Inc. (Joe Barrett)
John Daly
Devon Energy Corporation (Gary McGee)
JoAnn Homer
Independent Petroleum Association of America (Ben Dillon)
Jolen Operating Company (David Fleischaker)
Craig Newman
Bryon Oedekoven
Fred Oedekoven
Joel Ohman
Jack Overstreet
Petroleum Association of Wyoming (Rick Robitaille)
Prima Oil and Gas Company (Walter Lunsford)
Redstone Resources, Inc. (Mike Caskey)
Hap Stuart
Tom Brown, Inc. (Mary Sharon Balakas)
Tom Throne
Western Gas Resources, Inc. (Krista Mutch)
Senator Steve Youngbauer

Persons or companies financially supporting the Coal Bed Methane Ad Hoc Committee are as follows:

Thomas Barlow
Bear Paw Energy
Ray Broyles
Nancy Butcher
Wilma Carter

Appendix A

Chandler & Associates
Citation Oil & Gas
Colorado Interstate Gas Company
Ola Criffield
Dossett & Dossett
Duncan Energy Company
Farleigh Oil Properties, Inc.
First Interstate Bank, Gillette, WY
C.F. Goddwin
Mark Haight
Dean Hall
Bud Hayden
Independent Production Company
J.N. Exploration
Mary Keeney
Kennedy Oil Company
Sandra Lange
Lynde Trust
L.Y. Ranch
Mad House, Inc.
Louis McBeth
Jack McCartney
Jerry Moore
Mildred Parnell
Nancy Parnell
Penneco
Petroglyph Operating Company
Frances Putnam
Rawhide Resources
RIM Operating Company
Larry Stuart
Jerry Taylor
David Tate

Appendix A

Torch Energy
Yates Petroleum Corporation

Supreme Court, U.S.
FILED
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No. 98-830

IN THE
Supreme Court of the United States
OCTOBER TERM, 1998

AMOCO PRODUCTION COMPANY,
on behalf of itself and the class it represents,
Petitioners,

v.

SOUTHERN UTE INDIAN TBIBE,
Respondent.

On Petition for a Writ of Certiorari to the United States Court of Appeals for the Tenth Circuit

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AMICUS CURIAE BRIEF OF THE NATIONAL ASSOCIATION OF ROYALTY OWNERS, INC. IN SUPPORT OF THE PETITION FOR A WRIT OF CERTIORARI

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WILSON - EPES PRINTING CO., INC. - 789-0096 - WASHINGTON, D.C. 20001

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on behalf of itself and the class it represents,
Petitioners,

v.

SOUTHERN UTE INDIAN TBIBE,
Respondent.

On Petition for a Writ of Certiorari to the United States Court of Appeals for the Tenth Circuit

---

AMICUS CURIAE BRIEF OF THE NATIONAL ASSOCIATION OF ROYALTY OWNERS, INC. IN SUPPORT OF THE PETITION FOR A WRIT OF CERTIORARI

The National Association of Royalty Owners, Inc. (NARO) hereby submits this Brief of Amicus Curiae in Support of the Petition for Certiorari filed herein by Amoco Production Company.[1] The Petitioner, Amoco Production Company, and the Respondent, Southern Ute Indian Tribe, have consented in writing to the filing of this brief by NARO.

INTEREST OF AMICUS CURIAE

Who owns the right to explore for and produce coalbed methane gas (CBM): the owner of the gas estate or the

---

[1] Pursuant to Supreme Court Rule 37.6, the undersigned amicus curiae advise the Court that the Land Owners Coalseam Committee, an association of several hundred royalty owner defendants, made a financial contribution to the preparation of this Brief.

owners of the coal estate? That is the central question on this appeal and it is of national importance. CBM represents more than 5% of the nation's proved gas reserves and nearly 15% of potential reserves. Only three state supreme courts have considered the issue and they have reached different results.[2]

The Tenth Circuit decided the issue without applying principles of real property or oil and gas law. The rule of law that emerges from the Tenth Circuit opinion is that the government always wins.

> In fact, we have found no occasion in which a reservation of a mineral asset to the United States has been treated narrowly to exclude a newly appreciated value with that mineral. . . . Given the established principle that all doubts respecting land grants and mineral reservations are construed in favor of the government [citation omitted], we conclude that coal reserved to the United States in the 1909 and 1910 Acts includes the adsorbed CBM.

Southern Ute Indian Tribe v. Amoco Production Co., 151 F.3d 1251, 1266 (10th Cir. 1998). Under this specious logic, the Tenth Circuit would have reached the opposite result and concluded that CBM was part of the gas estate if the patents had reserved gas instead of coal.

A question of such national importance must be founded on higher principles. The Tenth Circuit's opinion determines ownership of CBM rights in 200,000 acres in which the respondent owns coal rights and will be precedent for ownership of CBM rights in 20.4 million acres in the states of Montana, North Dakota, Wyoming, Colorado,

---

[2] *Carbon County v. Union Reserve Coal Co.*, 898 P.2d 680 (Mont. 1995), holding that CBM is not part of the coal estate; *NCNB Texas National Bank v. West*, 631 So.2d 212 (Ala. 1993), holding that gas owners are entiled to produce CBM that escapes from the coal seam and coal owners are entitled to produce CBM that remains in the coal; and *United States Steel Corp. v. Hoge*, 468 A.2d 1380 (Pa. 1983), finding that CBM was considered a waste product at the time the deed was executed and would not have been retained under a reservation of oil and gas rights.

New Mexico and Utah that were patented under the same acts.

Within three months after the Tenth Circuit issued its opinion, Congress passed the Enzi Act, P.L.No. 105-367, § 1(a) & (b)(3), 112 Stat. 3313 (1998), to afford limited relief to owners of existing leases on lands in which the United States still owed the coal rights.

The National Association of Royalty Owners, Inc. (NARO) files this Brief in support of Amoco's petition for certorari and on behalf of an estimated 200,000 to 500,000 royalty owners who will be affected by the Tenth Circuit's opinion. According to NARO estimates, 65% of royalty owners are women. The average age is 65. The typical royalty owner acquired her mineral interest by inheritance from her ancestors who homesteaded the property. The average mineral owner receives $200 per month in royalty income and uses it to supplement Social Security and pension benefits. The freefall in oil prices in 1998 has sharply reduced the income of most mineral owners. The Tenth Circuit's opinion, if it stands, will deprive several hundred thousand mineral owners of gas royalties from the sale of CBM.

NARO is a non-profit organization consisting of approximately 5,000 owners of oil and gas royalty interests located in every state in which natural gas is produced. Its purposes are to educate mineral owners and promote their interests through state and federal legislation and appellate court decisions.

STATEMENT OF THE CASE

The Tenth Circuit's opinion fails to consider or discuss the facts of this case. The facts are as follows:

This appeal covers 200,000 acres in LaPlata County, Colorado, that were patented to homesteaders under the 1909 and 1910 Coal Land Acts, 30 U.S.C. §§ 81, 83-85. A typical patent under the 1909 Act contained the following words of grant:

> NOW KNOW YE, That the UNITED STATES OF AMERICA, in consideration of the premises, and in conformity with the several Acts of Congress in such case made and provided, HAS GIVEN AND GRANTED, and by these presents DOES GIVE AND GRANT, unto the said claimant and to the heirs of the said claimant the Tract above described; TO HAVE AND TO HOLD the same, together with all the rights, privileges, immunities, and appurtenances, of whatsoever nature, thereunto belonging, unto the said claimant and to the heirs and assigns of the said claimant forever.

Tribe's App. at 603. The same patent contained the following words of reservation of coal:

> reserving, also, to the United States, all coal in the lands so granted, and to it, or persons authorized by it, the right to prospect for, mine, and remove coal from the same upon compliance with the conditions of and subject to the limitations of the Act of March 3, 1909, entitled "An Act for the protection of the surface rights of entrymen."

Tribe's App. at 603.

A typical patent under the 1910 Act contained a similar grant and the following reservation of coal.

> reserving, also to the United States all coal in the lands so granted, and to it, or persons authorized by it, the right to prospect for, mine and remove coal from the same upon compliance with the conditions of and subject to the limitations of the Act of June 22, 1910 (36 Stat. 583).

Tribe's App. at 609.

The parties agree that these patents and the underlying Acts reserved coal to the United States and conveyed the surface and all other minerals, including oil and gas, to the homesteaders.

The United States created the Southern Ute reservation in LaPlata County in 1938 and conveyed equitable title

to the Southern Ute Indian Tribe in 450,000 acres in which no homestead had been estabilshed and 200,000 acres in which the United States had reserved coal rights through patents similar to those quoted above. The United States as Trustee for the Tribe thus owns all surface and mineral rights in 450,000 acres and coal rights in 200,000 acres. The Tribe's ownership is in a checkerboard pattern: it has equitable title to fee lands adjacent to and intermixed with lands where it has equitable title only to coal rights.

All coal discovered in LaPlata County is located in the Fruitland Coal Formation, which is found primarily at depths of 2,500 to 4,000 feet. Coal at these depths is too expensive to mine commercially. Coal is mined only at the outcrops, or where the Fruitland Coal Formation comes to the surface. Only one small coal mine is presently operating in LaPlata County.

Coalbed methane gas (CBM) is a form of natural gas. Methane is the primary constituent of all natural gases, including CBM. CBM is chemically indistinguishable from natural gas. It is produced in LaPlata County through conventional gas wells and processed in gas plants. It is delivered into gas pipelines where it is mixed with and transported with natural gas from other formations where it is resold to consumers of natural gas.

CBM is called coalbed gas because at some point it is contained in coalbed formations. As the trial court noted, "present day scientists who are experts in this field disagree whether CBM is part of coal." *Southern Ute Indian Tribe v. Amoco Production Co.*, 874 F.Supp. 1151, 1154 (D.Colo. 1995). Based on data collected from 750 wells, a recent study finds that only 25% of the gas in the Fruitland Coal Formation was generated "in situ" or through the coalification process. Andrew W. Scott et al., *Thermogenic and Secondary Biogenic Gases, San Juan Basin, Colorado and New Mexico—Implications for Coalbed Gas Producibility*, 78 Am. Assoc. Petroleum Geologists Bull. 1186 (1994). Up to 75% of the CBM was either gener-

ated by bacteria after the coalification process was completed or migrated as free gas in groundwater before being resorbed in the Fruitland Coal Formation.

CBM and other methane gases have a weak physical attraction to all reservoir rock, including coal and sandstones. This physical attraction is called adsorption.[3] The dissent in the Tenth Circuit opinion noted that this weak force is also known as van der Waal's forces. According to the Tribe's expert, van der Waal's forces occur "between most any pair of substances." The deposition of the Tribe's expert compared the adsorption of CBM to coal as similar to a paper's attraction to the table:

> Q. If I put this paper on the table, is the bottom page bound to the table by van der Waals forces?
>
> A. To a certain degree, yes.
>
> Q. Is it part of the table?
>
> A. No, it is not.

151 F.3d at 1271. CBM and other methane gases can exist freely in the cracks or fractures within the coal seam or dissolved in water contained in these fractures. Most CBM is contained in pore spaces of coal; high presure causes most the methane gas to be adsorbed to the coal. The coal reservoir, like any other natural gas reservoir, acts as a container for the methane gas. It is possible for methane gas in the Fruitland Coal to migrate naturally to sandstone formations in the Fruitland Coal or to other subsurface locations of lesser pressure. When a gas well is drilled into the reservoir, methane gas will migrate to the wellbore, where it is captured and reduced to possession by the operator. The CBM in the Fruitland Coal Formation cannot be reduced to possession by traditional coal mining; within 24 hours after the coal and the fracture system is exposed to the atmosphere, the methane gas

[3] Adsorption is the weak physical attraction by which gas or liquid clings to the surface of a solid, such as water being absorbed by a sponge.

escapes. The only way to capture gas contained in the Fruitland Coal is to drill a gas well.

The Southern Ute Indian Reservation is located on the north edge of the Greater San Juan Basin Gas Field, which is a major natural gas field in northern New Mexico and southern Colorado. The Reservation lies in that part of the Field known as the Ignacio Blanco Gas Field. According to a report prepared by the Tribe's geologist, Tribe's App. 1884-1923, natural gas was first discovered and produced in the Ignacio Blanco Gas Field in 1950. Five primary reservoirs, including the coal beds in the Fruitland Formation, have supplied virtually all the gas production from this Field. Natural gas was discovered in 1951 on the Ignacio Anticline[4] from the coals of the Fruitland Coal Formation. Most of the natural gas in this Field was produced from formations deeper than the Fruitland Coal Formation, but between 1951 and 1970, 28.5 billion cubic feet (Bcf) of natural gas were produced from 52 completed wells in the Fruitland Coal Formation on the Ignacio Anticline.

The Fruitland Coal wells started having water problems in 1956-57. All Fruitland Coal wells were abandoned by 1976 because the high water content made the wells uneconomical to produce.

Amoco revitalized drilling in the Fruitland Coal in 1981. Amoco determined that continued pumping of water would "dewater" the fracture systems and permit economic quantities of gas to flow to gas wells. According to the Tribe's geologist, Amoco completed four wells in the Fruitland Coal by using sucker-rod pumps (oil field pumps) to remove formation water in the coal seam,

[4] Ignacio is a town in southeast LaPlata County. An anticline is a subsurface, geological structure in the shape of an upside down bowl, that is, the formation rises to a rounded peak. Anticlinal structures in sedimentary rocks are good prospects for drilling, since any oil and gas in the deposit will normally rise to the highest point in the structure. Williams and Meyers, *Oil and Law, Manual of Oil and Gas Terms* (1987).

reducing the hydrostatic head and releasing the adsorbed methane from the coal reservoir. By 1981, nearly 20,000 wells in the San Juan Basin had been drilled through the Fruitland Formation for deeper production; operators dismissed the potential of the coalbed methane because of the high water content.

Amoco's discoveries coincided with the issuance of an opinion issued on May 12, 1981, by the Solicitor, attached as Appendix F to Amoco's petition for certiorari. The Solicitor's Opinion concluded that the owners of gas rights owned the right to explore for and produce CBM on federal lands. In effect, the United States through its Solicitor disclaimed title to gas produced from coal owned by the United States. A drilling boom ensued. Four hundred sixty successful wells were drilled and producing from the Fruitland Formation when the report of the Tribe's geologist was prepared in 1992.

Amoco and other operators produced CBM under oil and gas leases granted by the homesteaders' successors in interest and from the United States as trustee for the Tribe on lands in which the Tribe was the beneficial owner of surface and oil and gas rights.

The Southern Ute Indian Tribe filed this action in the District Court of Colorado in 1991, alleging that its coal rights on 200,000 acres entitled it to all coalbed methane gas produced from the Fruitland Coal Formation. The Tribe sued all gas producers and gas owners in the 200,000 acres where the Tribe owned only the coal rights. The district court certified a class of nonfederal defendants consisting of the working interest and royalty owners; Amoco was named as class representative.

On cross motions for summary judgment, the trial court found that the 1909 and 1910 Coal Land Acts were unambiguous and ruled that the plain meaning of coal did not include gas produced from coal reservoirs. 874 F. Supp. at 1151-1152. The trial court also ruled that the Solicitor's 1981 Opinion on the ownership of CBM rights

was entitled to deference under *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984). 874 F.Supp. at 1159-1160.

The Tenth Circuit reversed, findings that the Acts were ambiguous and that ambiguity or uncertainty in the terms employed in land grants are to be construed in favor of the government. *Southern Ute Indiian Tribe v. Amoco Production Co.*, 119 F.3d 816, 821 (10th Cir. 1997). The Tenth Circuit also held that the Solicitor's Opinion was not entitled to *Chevron* deference. The Tenth Circuit *en banc* held that the Acts were ambiguous as to whether Congress intended to reserve CBM and ruled that ambiguities in land grants must be construed in favor of the sovereign. *Southern Ute Indian Tribe v. Amoco Production Co.*, 151 F.3d 1251, 1267 (10th Cir. 1998). From this ruling, Amoco filed its petition for certiorari with this Court.

REASONS FOR GRANTING THE PETITION

Amoco has sought certiorari on the following grounds:

1. Ownership of CBM is an issue of national importance that must be resolved now to avoid major industry disruption and promote stability in land titles;
2. The Tenth Circuit committed fundamental error in interpreting major public lands statutes; and
3. This Court should resolve a split in the Circuit Courts of Appeal on *Chevron* deference.

I. OWNERSHIP OF CBM IS AN ISSUE OF NATIONAL IMPORTANCE

In interpreting reservations under public land acts, this Court has granted certiorari in at least three cases on the grounds that they were of national importance:

1. *Watt v. Western Nuclear, Inc.*, 462 U.S. 36, 42 (1983): "In view of the importance of this case to the administration of more than 33 million acres of land patented under the [Stock-Raising

Homestead Act of 1916], we granted certiorari." The issue was who owned gravel rights under this land act.

2. *Leo Sheep Co. v. United States*, 440 U.S. 668, 677 (1979): "Because this holding affects property rights in 150 million acres of land in the Western United States, we granted certiorari." The issue was whether the United States reserved an implied easement in lands granted to the railroad under the Union Pacific Act of 1862.

3. *United States v. Union Pacific Railroad Co.*, 353 U.S. 112, 113 (1957): "The case is here on a petition for a writ of certiorari which we granted in view of the public importance of the question presented." The issue was whether railroads owned mineral rights under lands granted to them under an 1862 act.

This appeal raises questions of equal or greater national importance. The Tenth Circuit's opinion determines ownership of CBM rights in 200,000 acres in which the respondent Tribe owns beneficial coal rights. The trial court estimated the value of the CBM on these lands at $200,000,000. The Tenth Circuit's opinion also will be precedent for ownership of CBM rights in 20.4 million acres in the states of Montana, North Dakota, Wyoming, Colorado, New Mexico and Utah that were patented under the same Coal Land Acts of 1909 and 1910.

In a year in which Washington was stalemated by the investigation into the Chief Executive, Congress acted within three months after the Tenth Circuit issued its opinion and passed the Enzi Act to afford limited relief to owners of existing leases on lands in which the United States still owned the coal rights.

CBM represents more than 5% of the nation's proved gas reserves and nearly 15% of potential reserves. The ownership of this important resource should be decided by the Nation's highest Court.

II. THE TENTH CIRCUIT COMMITTED FUNDAMENTAL ERROR IN INTERPRETING PUBLIC LAND ACTS

The Tenth Circuit committed fundamental error in determining the ownership of CBM:

> We are concerned not with the physical state of the substance as gas at the surface as it is now produced by modern technology, but rather with its physical state prior to extraction, as trapped in coal and economically inseverable in 1909.

151 F.3d at 1260-1261. In limiting its inquiry to the physical state of coal in the ground and the scientific knowledge available in 1909, the Tenth Circuit ignored the law of capture and correlative rights, bedrock principles of the common law that are recognized in all oil-and-gas jurisdictions.

The law of capture is based on the common law of wild animals. Oil and gas, like wild animals, are migratory. If a wild animal is resting on or roaming across a tract, the landowner cannot claim ownership of the wild animal until he traps the animal or otherwise reduces it to possession. Courts have treated oil and gas the same way, calling them minerals *ferae naturae*. Oil and gas is formed over millions of years and can naturally migrate hundreds of miles from its point of origin. In its modern subsurface locations, oil and gas can lie in formations or pools that extend across several miles. The landowner cannot claim ownership of the oil and gas merely because it underlies his land. He must drill a well and reduce it to possession at the surface before he can claim it as his own.

This rule, known as the law of capture, has been adopted in all oil-and-gas jurisdictions,[5] including the federal government. *Brown v. Spillman*, 155 U.S. 665, 669-670 (1895); *Champlin Ref. Co. v. Corporation Comm'n*, 286

[5] See authorities collected at Eugene Kuntz, *A Treatise on the Law of Oil and Gas* (1987) § 4.2.

U.S. 210, 233 (1932). A leading commentator has defined the law of capture as follows:

> According to the law of capture, in general terms, the landowner may capture oil or gas by operations on his land. He owns the substance absolutely once it has been reduced to dominion and control. Before the instant of control, however, the ownership of the substance or the right to capture and control it is subject to the possibility of capture and control by another acting within his own rights as a landowner and producing from a common source of supply. The owner of the drained tract has no legal remedy but may protect his right in the oil and gas by drilling on his own tract.

Kuntz, § 4.1. The law of capture applies to gas produced from coal reservoirs, *Trent v. Energy Dev. Corp.*, 902 F.2d 1143 (4th Cir. 1990), and to gas produced from other reservoirs, *Louisiana ex rel. Guste v. U.S.*, 832 F.2d 935, 938 (5th Cir. 1987). Based on the law of capture, gas is defined under federal regulations at the point where it is taken into possession or captured: at the well under atmospheric conditions. 43 C.F.R. § 3000.0-5(b).

The related common-law principle of correlative rights requires mineral owners to exercise due regard for the rights of other owners in extracting the minerals. Correlative rights, which have been recognized in all oil-and-gas jurisdictions, refer to all of the rights and duties that exist between landowners with regard to operations in a common source of supply. Kuntz, § 4.3.

The Tenth Circuit prematurely ended its inquiry. It concluded that CBM is owned by the coal owners because it can be adsorbed to coal while buried in the subsurface. Ownership of minerals in the subsurface formation is not dispositive. The Tenth Circuit recognized that CBM is gas at the surface as it is produced and reduced to possession by Amoco. The Tenth Circuit should have considered whether Amoco observed the correlative rights of the coal owners in drilling and completing its gas wells and producing the CBM.

Three state supreme courts have considered ownership of CBM; they properly focused the inquiry on correlative rights.[6]

In *Hoge*, CBM was produced as a by-product of mining operations. The value of the CBM was 1% of the BTU value of the coal. CBM is poisonous and must be vented or otherwise produced during coal mining operations. The Pennsylvania Supreme Court held that the coal owner may retain any CBM contained in coal that is brought to the surface and produced during coal mining operations so long as he observes the correlative rights of the owners of the gas estate:

> Hence, the coal owner may mine the coal and extract the gas from it, or both. If he chooses to extract the gas, drilling as well as hydrofracturing are available means, so long as their utilization does not impinge upon the rights of owners of the surrounding property, since the damage to coal inflicted by these processes is within his dominion to inflict.

468 A.2d at 1388. The Pennsylvania court recognized that CBM is migratory and that "the landowner, of course, has title to the property surrounding the coal, and owns such of the coalbed gas as migrates into the surrounding property." 468 A.2d at 1388.

NCNB also considered whether coal miners could retain CBM that was produced as a by-product of coal-mining operations. The field produced only 30 Mcf of methane per day [$60.00 per day at today's prices]. The Alabama Supreme Court found that because of the migratory nature of oil and gas, ownership of a mineral resource "requires actual possession to establish ownership of the resource." 631 So.2d at 223. Coal miners are entitled to keep CBM on the following conditions:

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[6] Without agreeing or disagreeing with the results in the CBM cases decided by the three state supreme courts, NARO endorses each state court's application of the law of capture and correlative rights.

> This bundle of property rights [for the coal owner] includes the right to reduce to possesion any gas trapped within the coal itself, so long as that gas remains within the coal until the time of its capture. However, as shown below, due to the migratory nature of natural gas, the coal owner would lose any right to possess coalbed methane gas once that gas migrates out of his property and thus beyond the right to reduce the gas to possession.

631 So.2d at 223-224. Even gas contained within coal at the beginning of the production process belongs to the gas owner if the gas migrates to another formation during the mining process. Gas owners were exclusively entitled to produce gas from "gob" wells in strata above the coal seams to which the gas migrated after the coal was mined. The discussion notes to Oil and Gas Reporter at 127 OGR 249-250 concluded that the NCNB decision was a victory for the gas owners: 70% of the gas produced came from gob wells.

In *Carbon County*, a gas producer sought to drill a gas well to produce CBM, but the coal owner sought an injunction and to quiet title in the CBM. The Montana Supreme Court held that the coal owners "may extract and capture coal seam methane gas for safety purposes during the mining process as such an incidental mining right, [but] the existence of that right does not, without a specific grant, also encompass either actual title to the gas estate or the right to produce it for commercial purposes." 898 P.2d at 689. In further considering the correlative rights of the coal owner and the gas owner, the Court found "the owner of the gas estate can also safely extract and produce coal seam methane gas either in advance of or during coal mining operations." 898 P.2d at 689.

The Montana Supreme Court thus held that the owner of the gas estate is entitled to drill and produce gas wells into coal formations, while the Alabama and Pennsylvania Supreme Courts concluded that coal operators may

produce CBM as a by-product of coal mining operations. The Alabama and Pennsylvania courts prohibit the coal miners from producing CBM if it is not contained in coal or if it migrates into other formations. The Tenth Circuit *en banc* overgeneralized the holdings of these cases and mistakenly concluded that "the majority of other states addressing the issue have also held that ownership of CBM is in the coal owner." 151 F.3d at 1262.

The Tenth Circuit's panel opinion dismissed these cases as irrelevant:

> The Tribe, the Amoco defendant, and the federal defendants have cited state court cases which have considered ownership of CBM. As interesting as these cases are . . . they are not dispositive in the case at bar. The state cases construe CBM ownership in the context of common law deeds, which are negotiated conveyances with specific rules and presumptions of construction. These cases ultimately have little to offer in terms of our interpretation of Congressional intent in the 1909 and 1910 Acts.

119 F.3d at 836, n.17. Justice Tracha's dissent also finds that these "state cases present different inquiries and different rules of construction than those at work in this case. Thus, as the panel said the first time around, they have extremely limited value here." 151 F.3d at 1275, n.3.

The Tenth Circuit misunderstands these cases. They are relevant not for their rules of construction of deeds between private parties, but for their analysis of the law of capture and the correlative rights of owners of separate mineral estates. Even if a wild animal is on your property, you do not own it until you reduce it to possession. Similarly, if gas is contained in your coal, you do not own it until you bring it to the surface. The Tenth Circuit recognizes that the CBM captured by Amoco is gas as it is produced at the surface. The Tenth Circuit should have considered whether Amoco violated any of the correlative rights of the coal owners in producing the gas. The fol-

lowing questions were raised by Amoco's operation and never considered by the Tenth Circuit:

1. Was the CBM contained in the coal when Amoco's wells were drilled?
2. Did the CBM originate in the coal or did it migrate into the coal?
3. Did Amoco damage the coal estate by producing the gas? If so, how much did this damage reduce the value of the coal estate and by how much?
4. Does the coal estate have any commercial value, or is the entire value attributed to the CBM? If the Tribe has no interest in mining the coal, is it entitled to drill gas wells to produce the CBM?
5. Does CBM within the Fruitland Coal flow naturally to Amoco's wells or is stimulation required? What is the nature of the stimulation that is required?
6. Is the CBM commingled with non-CBM gas when it is produced from Amoco's wells? If there is commingling, can the CBM be distinguished from the non-CBM gas and metered at the surface?

These questions can be resolved only by looking at contemporary scientific evidence. The Tenth Circuit held that such technical evidence was irrelevant. It limited its inquiry to the scientific evidence available in 1909 and the popular understanding of gas and coal in 1909. In putting on these blinders, the Tenth Circuit formulated a concept alien to oil-and-gas jurisprudence: ownership in the formation. Possession is no longer required in determining ownership of wild animals; ownership is determined by proving where the wild animals were born. Similarly, under the Tenth Circuit's novel theory, ownership of minerals *ferae naturae* is determined by looking at the minerals in their subsurface formation.

The Tenth Circuit's analysis is fatally incomplete. It is inconsistent with common law principles that are the

foundation of oil-and-gas jurisprudence. All land titles in the oil-and-gas producing states are founded on the law of capture and correlative rights. NARO respectfully asks this Court to grant the petition for certiorari and apply these principles to the land titles in this case.

III. THE TENTH CIRCUIT VIOLATED *CHEVRON* BY REFUSING TO RELY ON INTERIOR'S RULES AND REGULATIONS

The Tenth Circuit decided ownership of CBM by applying the following statutory analysis: (1) It looked to the plain meaning of the Acts of 1909 and 1910 and found them ambiguous as to the ownership of CBM, (2) It looked to the specific intent of Congress in enacting these Acts and found that the specific intent was ambiguous, (3) It looked to the general intent of Congress and the historical context behind the Acts and found that the general intent was ambiguous, and (4) on cross-motions for summary judgment it applied a rule of construction of last resort and held that all ambiguities in land grants must be construed in favor of the sovereign.

In finding all these ambiguities, the Tenth Circuit gave no weight to the voice of the sovereign as expressed by the Secretary of the Interior in rules and regulations for managing the government's coal and gas estates. In his 1981 Opinion, the Solicitor concluded that CBM is "both scientifically defined and legally regarded as a gas." See Amoco's petition for cert., App. 143a. The Solicitor further concluded that a coal lease does not include the right to extract CBM and that producers must obtain oil and gas leases from the Department of Interior before they are entitled to prouce CBM. App. 155a-156a.

The Tenth Circuit held that the Solicitor's Opinion was not entitled to deference under *Chevron* or *Skidmore v. Swift & Co.*, 323 U.S. 134 (1944), and that it was arbitrary and capricious. The Solicitor's Opinion was defective, according to the Tenth Circuit, because it considered

the state law cases on CBM. 119 F.3d at 835. As NARO argued in the preceding section, these cases properly looked to the common-law principles of the law of capture and correlative rights. The Tenth Circuit was arbitrary and capricious in failing to apply these common-law principles.

The Tenth Circuit also dismissed the Solicitor's Opinion because it was neither a legislature rule nor an adjudication. The Tenth Circuit ignored an adjudication in the record below that concluded that the gas owner, and not the United States as the owner of coal reserved under the Coal Land Acts, was entitled to produce CBM from coal formations. *Amoco Production Co.*, GS-181-O&G (U.S.G.S. July 22, 1981). Tribe's App. at 2062.

The Tenth Circuit cited the following cases in support of its conclusion that mineral reservations must be construed expansively in favor of the sovereign: *Watt v. Western Nuclear*, 462 U.S. 36; *Aulston v. United States*, 915 F.2d 584 (10th Cir. 1990); and *Brennan v. Udall*, 379 F.2d 803 (10th Cir. 1967). Incredibly, each of these cases deferred to an agency interpretation. This Court found in *Western Nuclear*: "It is also highly pertinent that federal administrative and judicial decisions over the past half-century have consistently recognized that gravel deposits could be located under the general mining laws. . . ." 462 U.S. at 57. In *Brennan*, the 10th Cir. cuit held:

> Although the position of the Department of the Interior has varied over the years . . ., it has consistently construed the 1914 Act to authorize the classification of lands containing oil shale deposits as a valuable source of petroleum and nitrogen and to require the reservation of such deposits when patents are issued.

379 F.2d at 806. The Tenth Circuit in *Aulston* deferred to the Department of Interior's interpretation of a 1914 act to include carbon dioxide in the Act's reservation of gas. 915 F.2d at 595.

Besides dismissing the Solicitor's Opinion, the Tenth Circuit ignored regulations adopted over the past century by the Department of Interior in separately administering the coal, gas and mineral estates reserved by the federal government under the Coal Land Acts of 1909 and 1910 and other land acts. Interior's regulations divide hydrocarbon minerals into three categorics based on their physical properties: (1) nongaseous solids, which include coal and solid minerals other than coal, (2) oil, which is defined as all nongaseous fluid hydrocarbons, including condensates that may be in a gaseous state under reservoir conditions but condense into liquid form at atmospheric conditions, and (3) gas, which is defined as all substances, combustible or noncomubustible, that are gaseous at atmospheric conditions. Interior thus defines gas, oil and coal as mutually exclusive substances and mutually exclusive property rights. *See* 43 C.F.R. § 3400, et seq., Coal Management; 43 C.F.R. § 3500, et seq., Management of Solid Minerals Other Than Coal; and 43 C.F.R. § 3100, et seq., Oil and Gas Leasing.

Interior regulations also provide that if a substance contained in a coal reservoir, such as methane, can be produced in a natural and gaseous state from the earth, it is defined as gas and belongs to the owner of the gas estate:

> Gas: means any fluid, either combustible or noncombustible, which is produced in a natural state from the earth and which maintains a gaseous or rarefied state at ordinary temperatures and pressure conditions.

43 C.F.R. § 3000.0-5(a). *See also* 30 C.F.R. § 206.171 (Indian gas).

The Tenth Circuit's opinion cannot be reconciled with the rules, regulations and adjudications of the Department of Interior. The Tenth Circuit has substituted its opinion for the determinations made by Interior in administering the coal rights reserved by the United States under the Coal Land Acts.

Amoco forcefully argued in its petition for certiorari that the Solicitor's Opinion was entitled to *Chevron* deference and that certiorari should be granted to resolve a split in the circuit courts on this issue. NARO further submits that the Tenth Circuit should have deferred to the rules and regulations concerning CBM adopted by the Department of Interior over the past century. Similar rules and regulations were deferred to by this Court in *Western Nuclear* and by the Tenth Circuit in *Brennan* and *Aulston*.

CONCLUSION

The Tenth Circuit has ignored fundamental principles of oil-and-gas law in determining ownership of CBM. These common-law principles are the foundation upon which mineral titles are based in all oil-and-gas producing states. Further, the Tenth Circuit has ignored rules, regulations and adjudications of the Department of Interior in administering oil, gas and coal reserved by the United States. The Tenth Circuit has divested hundreds of thousands of royalty owners of gas rights that were patented to their ancestors. NARO respectfully requests that this Court grant certiorari to determine ownership of this important energy resource.

Respectfully submitted,

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No. 98-830

IN THE

Supreme Court of the United States

OCTOBER TERM, 1998

AMOCO PRODUCTION COMPANY, on behalf of itself and the class it represents,*

Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,

and

BRUCE BABBITT, Secretary of the United States Department of Interior, *et al.*,

Respondents.

On Writ of Certiorari to the United States Court of Appeals for the Tenth Circuit

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VOLUME I

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PETITION FOR CERTIORARI FILED: NOVEMBER 18, 1998
CERTIORARI GRANTED: JANUARY 22, 1999
ORDER GRANTING CERTIORARI AMENDED: JANUARY 29, 1999

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Phillip J. Wilson and J.H. Wells, *Coal, Coke, and Coal Chemicals*, Chemical Engineering Series (1950) 527

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Robert A. Myers, *Coal Handbook* (1981) 543

William F. Clark and Tom Hemler, *Completing, Equipping, and Operating Fruitland Formation Coal-Bed Methane Wells in the San Juan Basin, New Mexico and Colorado reprinted in* James E. Fasset, *Geology and Coal-Bed Methane Resources of the Northern San Juan Basin, Colorado and New Mexico*, Rocky Mtn. Ass'n of Geologists (1988) 553

Jeffrey R. Levine, *Coal Composition, as Related to the Mode of Occurrence of "Coalbed Methane"* (1992) 579

NOTICE

The following documents have been omitted in the printing of this Joint Appendix. They are reproduced in the Appendix to the Petition For A Writ Of Certiorari on the pages indicated below:

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UNITED STATES DISTRICT COURT
DISTRICT OF COLORADO

Case 1:91cv02273

SOUTHERN UTE INDIAN TRIBE,
Plaintiff,

v.

AMOCO PRODUCTION CO., *et al.*,
Defendants.

DOCKET ENTRIES

Sub #	Date	Description
1	12/31/91	COMPLAINT (Summons(es) issued) (ns)
—	12/31/91	FILING FEE PAID: on 12/31/91 in the amount of $ 120.00, receipt # 139487. (ns)
2	1/16/92	RETURN OF SERVICE of Summons and Complaint upon defendant Jack Carmack on 1/13/92 (sh) [Entry date 01/17/92]
3	1/16/92	RETURN OF SERVICE of Summons and Complaint upon defendant Louis M. Cummins on 1/13/92 (sh) [Entry date 01/17/92]
4	2/3/92	RETURN OF SERVICE (typed on back of Summons that service was by Certified Mail) of Summons and Complaint upon defendant Manuel Lujan Jr. on 1/13/92 (sh) [Entry date 02/04/92]
6	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Union TX Petroleum on 1/23/92, by hand delivery to Rita Aldridge, Senior Adm. Clerk. (sh) [Entry date 02/04/92]

Sub #	Date	Description
7	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Williams Production on 1/23/92 by hand delivery to Barbara Sena at the Corporation Company. (sh) [Entry date 02/04/92]
8	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Richmond Petroleum on 1/23/92 by hand delivery to Barbara Sena at The Corporation Co. (sh) [Entry date 02/04/92]
9	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Palo Petroleum, Inc. on 1/23/92 by hand delivery to Barbara Sena at The Corporation Co. (sh) [Entry date 02/04/92]
10	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Pablo Operating Co on 1/27/92 by hand deliver to Bruce Heller. (sh) [Entry date 02/04/92]
11	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Northwest Pipeline on 1/23/92 by hand delivery to Barbara Sena at The Corporation Co. (sh) [Entry date 02/04/92]
12	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Mobil Oil Corp on 1/23/92 by hand delivery to Sherri McNabb. (sh) [Entry date 02/04/92]
13	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Meridian Oil, Inc. on 1/23/92 by hand delivery to Barbara Sena at the Corporation Co. (sh) [Entry date 02/04/92]
14	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant McKenzie Methane on 1/23/92 by hand delivery to Barbara Sena at The Corporation Co. (sh) [Entry date 02/04/92]

Sub #	Date	Description
15	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Markwest Energy Prt on 1/23/92 by hand delivery to Reg. Agent David Padgett. (sh) [Entry date 02/04/92]
16	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant JM Huber Corporation on 1/23/92 by hand delivery to Reg. Agent Barbara Sena. (sh) [Entry date 02/04/92]
17	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Fuel Resources Dev on 1/23/92 by hand deliver to Reg. Agent Debbie Artzer. (sh) [Entry date 02/04/92]
18	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Conoco, Inc. on 1/23/92 by hand delivery to Reg. Agent Barbara Sena. (sh) [Entry date 02/04/92]
19	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Amax Oil & Gas, Inc. on 1/23/92 by hand delivery to Reg. Agent Barbara Sena. (sh) [Entry date 02/04/92]
20	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Shareholders of Hondo Oil & Gas Co on 1/23/92 by hand delivery to Barbara Sena, Reg. Agent. (sh) [Entry date 02/04/92]
21	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Phillips Petroleum on 1/23/92 by hand delivery to the

Sub #	Date	Description
		Reg. Agent, Burt Plender. (sh) [Entry date 02/04/92]
22	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant North Central Oil on 1/23/92 by hand delivery to their Reg. Agent, Barbara Sena. (sh) [Entry date 02/04/92]
23	2/3/92	ACCEPTANCE / ACKNOWLEDGEMENT OF SERVICE by defendant Laura Belle Aspaas mailed on 1/21/92; signed Laura Belle Aspaas (sh) [Entry date 02/04/92]
24	2/3/92	ACCEPTANCE / ACKNOWLEDGEMENT OF SERVICE by defendant Helen Ruth Aspaas mailed on 1/22/92; signed Helen Ruth Aspaas (sh) [Entry date 02/04/92]
25	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Natl Coop Refinery on 1/23/92 by hand delivery to Reg. Agent Barbara Sena. (sh) [Entry date 02/04/92]
26	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Delos Cy Jamison on 1/8/92 by Certified Mail upon Attorney General in Washington. (sh) [Entry date 02/04/92]
27	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Delos Cy Jamison on 1/16/92 by leaving with U.S. Attorney. (sh) [Entry date 02/04/92]
5	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Manuel Lujan Jr. on 1/16/92 by leaving with U.S. Attorney. (sh) [Entry date 02/04/92]
28	2/3/92	RETURN OF SERVICE (By Certified Mail—Receipt returned 1/14/92) of Summons and Complaint upon defendant DOI on 1/8/92 (sh) [Entry date 02/04/92]

Sub #	Date	Description
28	2/3/92	RETURN OF SERVICE (By Certified Mail—Return receipt rec'd 1/13/92) of Summons and Complaint upon defendant DOI on 1/13/92 by mailing to the Attorney General in Washington. (sh) [Entry date 02/04/92]
28	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant DOI on 1/16/92 by hand delivery to U.S. Attorney's Office. (sh) [Entry date 02/04/92]
29	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant BIA (by Certified Mail—Return Receipt received on 1/13/92) (sh) [Entry date 02/04/92]
29	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant BIA on 1/8/92 (by certified Mail to Attorney General in Washington—return receipt rec'd 1/13/92). (sh) [Entry date 02/04/92]
29	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant BIA on 1/16/92 by hand delivery to U.S. Attorney's office. (sh) [Entry date 02/04/92]
30	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Eddie F. Brown on 1/8/92 (by Certified Mail—return receipt rec'd 1/14/92) (sh) [Entry date 02/04/92]
30	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Eddie F. Brown on 1/8/92 by Certified Mail upon Attorney General in Washington—return receipt rec'd 1/13/92. (sh) [Entry date 02/04/92]

Sub #	Date	Description
30	2/3/92	RETURN OF SERVICE of Summons and Complaint upon defendant Eddie F. Brown on 1/16/92 by hand delivery to United States Attorney's office. (sh) [Entry date 02/04/92]
31	2/6/92	Copy of LETTER to Plf's counsel from defendant Phillips Petroleum's counsel re extension of time to 3/4/92 in which to answer or otherwise respond to the complaint. (sh) [Entry date 02/07/92]
32	2/6/92	MOTION by defendant McKenzie Methane to extend time to answer plf's complaint to 3/3/92 (sh) [Entry date 02/07/92]
33	2/7/92	ACCEPTANCE / ACKNOWLEDGEMENT OF SERVICE by defendant Carla M. Aspaas mailed on 1/22/92; signed by Carla M. Aspaas Foland on 1/27/92. (sh)
34	2/7/92	RETURN OF SERVICE of Summons and Complaint upon defendant Minerals Mgt Service by Certified Mail sent on 1/8/92—no return receipt received. (sh) [Edit date 02/07/92]
34	2/7/92	RETURN OF SERVICE of Summons and Complaint upon Attorney General for defendant Minerals Mgt Service by Certified Mail on 1/8/92—no return receipt card received. (sh)
34	2/7/92	RETURN OF SERVICE of Summons and Complaint upon U.S. Attorney's Office for defendant Minerals Mgt Service by hand delivery to Linda Blan on 1/16/92 (sh)
35	2/7/92	ACCEPTANCE / ACKNOWLEDGEMENT OF SERVICE by defendant Eric K. Aspaas mailed on 1/22/92; signed by Eric K. Aspaas on 1/28/92. (sh)

Sub #	Date	Description
36	2/7/92	RETURN OF SERVICE of Summons and Complaint upon defendant Scott S. Sewell, Director of Minerals Mgmt. Service by Certified Mail on 1/8/92—no return receipt received. (sh)
36	2/7/92	RETURN OF SERVICE of Summons and Complaint upon defendant Scott S. Sewell, Director of Minerals Mgmt. Service by Certified Mail to Attorney General in Washington D.C. on 1/8/92—no return receipt received. (sh)
36	2/7/92	RETURN OF SERVICE of Summons and Complaint upon defendant Scott S. Sewell, Director of Minerals Mgmt. Service by hand delivery to the U.S. Attorney's office on 1/16/92, signed by Linda Blan (sh)
37	2/7/92	RETURN OF SERVICE of Summons and Complaint upon defendant BLM by Certified Mail sent on 1/8/92—no return receipt received. (sh)
37	2/7/92	RETURN OF SERVICE of Summons and Complaint upon defendant BLM by Certified Mail to Attorney General on 1/8/92—no return receipt received. (sh)
37	2/7/92	RETURN OF SERVICE of Summons and Complaint upon defendant BLM by hand delivery to U.S. Attorney's office on 1/16/92, signed by Linda Blan (sh)
38	2/10/92	MINUTE ORDER: by Judge Lewis T. Babcock granting motion to extend time to answer plf's complaint to 3/3/92 [32-1] (cc: all counsel); entry date: 2/10/92 (sh)
39	2/10/92	MOTION by defendant Markwest Energy Prt to extend time to answer Complaint (sh)

Sub #	Date	Description
40	2/10/92	LETTER to court from James P. Graham, President of defendant Palo Petroleum, Inc. asking for time to 3/3/92 in which to answer Plf's Complaint. (sh)
41	2/10/92	MINUTE ORDER: by Judge Lewis T. Babock granting Markwest Energy Partners, Ltd's motion to extend time to 3/3/92 to answer Complaint [39-1] (cc: all counsel); entry date: 2/11/92 (sh) [Entry date 02/11/92]
42	2/10/92	MOTION by defendant Conoco, Inc. for attorney Thomas H. Burton, Jr. to appear pro hac vice (sh) [Entry date 02/11/92]
43	2/10/92	ANSWER by defendant Conoco, Inc. to complaint [1-1] (sh) [Entry date 02/11/92]
44	2/11/92	MOTION by defendant Hondo Oil & Gas Co to extend time to file responsive pleading (sh) [Entry date 02/12/92]
45	2/11/92	MOTION by defendant Richmond Petroleum to extend time to answer (sh) [Entry date 02/12/92]
46	2/11/92	MINUTE ORDER: by Judge Lewis T. Babcock granting motion for attorney Thomas H. Burton, Jr. to appear pro hac vice [42-1] (cc: all counsel); entry date: 2/12/92 (sh) [Entry date 02/12/92]
47	2/11/92	ANSWER by defendant JM Huber Corporation to complaint [1-1] (sh) [Entry date 02/12/92]
48	2/11/92	MINUTE ORDER: by Judge Lewis T. Babcock striking answer [47-1]; striking motion to extend time to file responsive pleading [44-1] for failure by counsel to comply with Local Rule 301 (cc: all counsel); entry date 2/12/92 (sh) [Entry date 02/12/92]
49	2/12/92	Supplemental CERTIFICATE OF MAILING by defendant Conoco, Inc. re mailing of Answer of deft Conoco and Motion for Pro Hac Vice Admission of Out-of State Counsel (sh)
50	2/12/92	MOTION by defendant—Mobil Oil Corp to extend time to 3/3/92 to answer (sh)
51	2/12/92	MOTION by defendant Pablo Operating Co to extend time to answer or otherwise respond (sh) [Entry date 02/13/92]
52	2/12/92	MOTION by defendant Meridian Oil, Inc. to extend time to answer or otherwise respond (sh) [Entry date 02/13/92]
53	2/12/92	MOTION by defendant Fuel Resources Dev to extend time to file responsive pleadings (sh) [Entry date 02/13/92]
54	2/12/92	MOTION by defendant Natl Coop Refinery to extend time to file responsive pleadings (sh) [Entry date 02/13/92]
55	2/12/92	MOTION by defendant Bowen/Edwards Assoc to extend time to respond to complaint (sh) [Entry date 02/13/92]
56	2/13/92	MINUTE ORDER: by Judge Lewis T. Babcock striking Dft Bowen/Edwards Assoc. Inc.'s motion to extend time to respond to complaint [55-1]; a corporation cannot appear without counsel. (cc: all counsel); entry date: 2/14/92 (sh) [Entry date 02/14/92]
57	2/13/92	MINUTE ORDER: by Judge Lewis T. Babcock granting motions to extend time to answer or otherwise respond by Dft. Mer-

Sub #	Date	Description
		idian Oil [52-1] to 3/3/92; by Dft. Pablo Operating Co. [51-1] to 3/7/92; by Dft. National Cooperative Refinery Assoc. [54-1] to 3/3/92; by Fuel Resources Development [53-1] to 3/3/92; by Mobil Oil [50-1] to 3/3/92; by Richmond Petroleum, Inc. [45-1] to 3/3/92. (cc: all counsel); entry date: 2/14/92 (sh) [Entry date 02/14/92]
58	2/18/92	ATTORNEY APPEARANCE for defendant Northwest Pipeline, defendant Williams Production by Mark C. Moench (sh)
59	2/18/92	MOTION by defendant Northwest Pipeline, defendant Williams Production to extend time to 3/3/92 to file an answer or other responsive pleading (sh)
60	2/18/92	ORDER by Judge Lewis T. Babcock granting motion to extend time to 3/3/92 to file an answer or other responsive pleading [59--1] (cc: all counsel); entry date: 2/18/92 (sh)
61	2/20/92	RETURN OF SERVICE of Summons and Complaint upon defendant Tiffany Gas Company on 2/12/92 by hand deliver to J.R. Kroeger, agent. (sh) [Entry date 02/21/92]
62	2/20/92	ACCEPTANCE / ACKNOWLEDGEMENT OF SERVICE by defendant Rowland Carmack mailed on 1/21/92; signed by W. Rowland Carmack on 2/11/92. (sh) [Entry date 02/21/92]
63	2/20/92	ACCEPTANCE / ACKNOWLEDGEMENT OF SERVICE by defendant Bowen/Edwards Assoc mailed on 1/21/92; signed by J. Keith Edwards, President, on 2/11/92. (sh) [Entry date 02/21/92]

Sub #	Date	Description
64	2/20/92	ACCEPTANCE / ACKNOWLEDGEMENT OF SERVICE by defendant Amoco Production Co mailed on 1/21/92; signed by David Brody, Attorney for Amoco Production Co. on 2/10/92. (sh) [Entry date 02/21/92]
65	2/24/92	RETURN OF SERVICE of Summons and Complaint upon defendant Anthony F. Zarlengo on 2/14/92 (sh) [Edit date 02/24/92]
66	2/24/92	RETURN OF SERVICE of Summons and Complaint upon defendant Anthony H. Veto on 2/12/92 (sh) [Edit date 02/24/92]
67	2/24/92	RETURN OF SERVICE of Summons and Complaint upon defendant Frederick Petrocco on 2/15/92 (sh) [Edit date 02/24/92]
68	2/24/92	RETURN OF SERVICE of Summons and Complaint upon defendant Clara Onofrio on 2/15/92 by hand delivery to Frederick Petrocco, personally, for his Mother, Clara Onofrio. (sh) [Edit date 02/24/92]
69	2/24/92	RETURN OF SERVICE of Summons and Complaint upon defendant Edwin L. McKelvey on 2/15/92 (sh)
70	2/24/92	RETURN OF SERVICE of Summons and Complaint upon (deceased) defendant Frederick E. Dickerson on 2/16/92 by hand delivery to Martha Dickerson, his wife. (sh)
71	2/24/92	RETURN OF SERVICE of Summons and Complaint upon defendant Dorothy A. Corgin on 2/16/92 (sh)
72	2/24/92	RETURN OF SERVICE of Summons and Complaint upon defendant Colo Natl Bk Longmnt, as Conservator of the Estate of

Sub #	Date	Description
		Gladys N. Frazzini, deceased, on 2/13/92 by hand delivery to Janet Pearson, Vice President of the Bank. (sh)
73	2/24/92	RETURN OF SERVICE of Summons and Complaint upon defendant Colo Natl Bk Denver, as Trustee of the George Veto Trust, on 2/12/92 by hand delivery to Ronald M. Wilson, as Assistant Vice President of the Bank. (sh)
74	2/24/92	RETURN OF SERVICE of Summons and Complaint upon defendant Heirs of Horace Buchanan on 2/15/92 by hand delivery to Helen Leonardelli. (sh)
75	2/24/92	RETURN OF SERVICE of Summons and Complaint upon defendant Heirs of Horace F. Buchanan on 2/15/92 by hand delivery to Helen Leonardelli, Mother of Joel E. Buchanan. (sh)
76	2/24/92	RETURN OF SERVICE of Summons and Complaint upon defendant Maxwell (aka Maxine) C. Anderson on 2/17/92 (sh)
77	2/24/92	RETURN OF SERVICE of Summons and Complaint upon defendant Fidel Lucero on 2/17/92 (sh)
78	2/24/92	RETURN OF SERVICE of Summons and Complaint upon defendant Robert Galbasin on 2/14/92—Deft refused to accept service into his hands. Summons and Complaint were left on the premises with the full knowledge of Deft. (sh)
79	2/24/92	MOTION by defendant Louis M. Cummins to extend time to answer complaint (sh)
80	2/24/92	MOTION by defendant Tiffany Gas Company to extend time to answer or file other responsive pleading to complaint (sh)

Sub #	Date	Description
81	2/24/92	MOTION by defendant Anthony F. Zarlengo (pro se) to extend time to answer Plf's Complaint (sh)
82	2/24/92	ATTORNEY APPEARANCE for defendant Phillips Petroleum by George M. Paulson Jr. (sh)
83	2/24/92	MOTION by defendant Phillips Petroleum to extend time to answer or otherwise plead (sh)
84	2/24/92	ORDER by Judge Lewis T. Babcock granting Tiffany Gas Co.'s motion to extend time to 3/23/92 to answer or file other responsive pleading to complaint [80-1] (cc: all counsel); entry date: 2/25/92 (sh) [Entry date 02/25/92]
85	2/24/92	ORDER by Judge Lewis T. Babcock granting Anthony Zarlengo's motion to extend time to 4/5/92 to answer Plf's Complaint [81-1] (cc: all counsel); entry date: 2/25/92 (sh) [Entry date 02/25/92]
86	2/24/92	ORDER by Judge Lewis T. Babcock granting Phillips Petreleum's motion to extend time to 3/4/92 to answer or otherwise plead to Plf's Complaint [83-1] (cc: all counsel); entry date: 2/25/92 (sh) [Entry date 02/25/92]
87	2/24/92	MINUTE ORDER: by Judge Lewis T. Babcock denying without prejudice Louis M. Cummins' motion to extend time to answer complaint [79-1] for failure to comply with Local Rule 402 C. (cc: all counsel); entry date: 2/25/92 (sh) [Entry date 02/25/92]
88	2/28/92	ANSWER by defendant JM Huber Corporation to complaint [1-1] (sh)

Sub #	Date	Description
89	3/2/92	RETURN OF SERVICE of Summons and Complaint upon defendant Anna Carleo Tomeo on 2/17/92 (sh)
90	3/2/92	RETURN OF SERVICE of Summons and Complaint upon defendant Ernest Tomeo on 2/17/92 by hand delivery to Anna Carleo Tomeo, his wife. (sh)
91	3/2/92	MOTION by defendant Hondo Oil & Gas Co, defendant Palo Petroleum, Inc. for attorney James Bruce to appear pro hac vice (sh)
92	3/2/92	MOTION by defendant Palo Petroleum, Inc. to extend time to 3/23/92 to answer/respond to complaint. (sh)
93	3/2/92	MOTION by defendant Hondo Oil & Gas to extend time to answer/file responsive pleading to Complaint (sh)
94	3/2/92	MOTION by defendant McKenzie Methane to extend time to 3/23/92 to answer Complaint (sh)
95	3/2/92	ANSWER by defendant Amoco Production Co to complaint [1-1] (sh)
96	3/2/92	MOTION by defendant Northwest Pipeline, defendant Williams Production for attorney Teresa Silcox to appear pro hac vice (sh)
97	3/2/92	MOTION by defendant Northwest Pipeline, defendant Williams Production to withdraw attorney Mark C. Moench of Salt Lake City. (sh) [Entry date 03/03/92]
98	3/2/92	ANSWER by defendant Northwest Pipeline, defendant Williams Production to complaint [1-1] (sh) [Entry date 03/03/92]

Sub #	Date	Description
99	3/3/92	MINUTE ORDER: by Judge Lewis T. Babcock granting motion to extend time to 3/23/92 to answer Complaint [94-1] (cc: all counsel) ; entry date: 3/3/92 (yk)
100	3/3/92	ORDER by Judge Lewis T. Babcock granting motion for attorney James Bruce to appear pro hac vice [91-1] (cc: all counsel) ; entry date: 3/3/92 (yk)
101	3/3/92	ORDER by Judge Lewis T. Babcock granting motion to extend time to answer/file responsive pleading to Complaint [93-1] to 3/3/92 (cc: all counsel) ; entry date: 3/3/92 (yk)
102	3/3/92	ORDER by Judge Lewis T. Babcock granting motion to extend time to 3/23/92 to answer/respond to complaint. [92-1] (cc: all counsel) ; entry date: 3/3/92 (yk)
103	3/3/92	ANSWER by defendant Markwest Energy Prt complaint [1-1] (yk)
104	3/3/92	MOTION by defendant - Mobil Oil Corp for attorney Larry Whyte and R. Dennis Ickes to appear pro hac vice (yk)
105	3/3/92	ANSWER by defendant Richmond Petroleum complaint [1-1] (yk)
106	3/3/92	ANSWER by defendant - Mobil Oil Corp complaint [1-1] (yk)
107	3/3/92	ANSWER by defendant Natl Coop Refinery complaint [1-1] (yk)
108	3/3/92	ANSWER by defendant Fuel Resources Dev complaint [1-1] (yk)
109	3/3/92	Renewal of MOTION by defendant Louis M. Cummins to extend time to answer complaint. (sh) [Entry date 03/04/92]

Sub #	Date	Description
110	3/3/92	Acknowledgment of RECEIPT of a copy of Motion for Extension, signed by Louis M. Cummins. (sh) [Entry date 03/04/92]
111	3/3/92	MOTION by defendant Meridian Oil, Inc., defendant Amax Oil & Gas, Inc. for more definite statement, or to dismiss for failure to state a claim. (sh) [Entry date 03/04/92]
112	3/3/92	Joint MOTION by plaintiff Southern Ute Indian, defendant Amoco Production Co for hearing (to set scheduling conf), for consideration of proposed case management order no. 1, and to stay responses of individuals to the complaint; (the attached proposed Case Management Order No. 1 was sent to the Judge's Chambers). (sh) [Entry date 03/04/92] [Edit date 03/04/92]
113	3/3/92	ANSWER by defendant Meridian Oil, Inc. to complaint [1-1] (sh) [Entry date 03/04/92]
114	3/3/92	ANSWER by defendant Amax Oil & Gas, Inc. to complaint [1-1] (sh) [Entry date 03/04/92]
115	3/3/92	MOTION by defendant Amax Oil & Gas, Inc. to vacate default, and to extend time to 3/3/92 to answer or otherwise respond to complaint. (sh) [Entry date 03/04/92]
116	3/3/92	MOTION by defendant Colo Natl Bk Denver, defendant Colo Natl Bk Longmnt to extend time to answer/otherwise respond to Plf's Complaint. (sh) [Entry date 03/04/92]
117	3/4/92	MOTION by defendant Bowen/Edwards Assoc to extend time to answer/respond to Complaint. (sh)

Sub #	Date	Description
118	3/4/92	ANSWER by defendant Phillips Petroleum to complaint [1-1] (sh) [Entry date 03/05/92]
119	3/4/92	MOTION by defendant Phillips Petroleum for joinder in joint motion of Plf and Deft Amoco Production for scheduling conf, consideration of proposed case management order no. 1, and for limited stay of responses to the complaint. (sh) [Entry date 03/05/92]
120	3/4/92	ORDER by Judge Lewis T. Babcock granting motion for attorney Larry Whyte and R. Dennis Ickes to appear pro hac vice [104-1] (cc: all counsel); entry date: 3/5/92 (sh) [Entry date 03/05/92]
121	3/4/92	MINUTE ORDER: by Judge Lewis T. Babcock granting motion to withdraw attorney Mark C. Moench of Salt Lake City [97-1] for Williams Production, for Northwest Pipeline; granting Colorado National Bank-Denver and Colorado National Bank-Longmont's motion to extend time to 3/23/92 to answer/otherwise respond to Plf's Complaint [116-1]; granting Louis Cummins' renewal of motion to extend time to 3/23/92 to answer complaint [109-1]; granting motion for attorney Teresa Silcox to appear pro hac vice [96-1]. (cc: all counsel); entry date: 3/5/92 (sh) [Entry date 03/05/92]
122	3/5/92	JOINDER by defendant Markwest Energy Prt re motion for hearing (to set scheduling conf) [112-1], re motion to stay responses of individuals to the complaint [112-2] (sh)
123	3/6/92	ORDER by Judge Lewis T. Babcock granting motion to extend time to 3/3/92 to

Sub #	Date	Description
		answer/respond to Complaint. [117-1] (cc: all counsel); entry date: 3/6/92 (sh)
124	3/6/92	MINUTE ORDER: by Judge Lewis T. Babcock finding Amax Oil and Gas' motion to vacate default [115-1] moot, since default has not been entered; granting Amax Oil and Gas' motion to extend time to 3/3/92 to answer or otherwise respond to complaint [115-2] (cc: all counsel); entry date: 3/6/92 (sh)
125	3/6/92	ANSWER by defendant Pablo Operating Co to complaint [1-1] (sh)
126	3/6/92	MOTION by defendant Pablo Operating Co for more definite statement, or to dismiss for failure to state a claim. (sh)
127	3/6/92	MOTION by defendant Edwin L. McKelvey to extend time to 3/26/92 to answer Complaint (sh) [Entry date 03/09/92]
128	3/6/92	MOTION by defendant Meridian Oil, Inc. for leave to respond by 3/20/92 to Joint Motion of Plf and Deft Amoco Prod Co. (sh) [Entry date 03/09/92]
129	3/9/92	RESPONSE by plaintiff Southern Ute Indian to motion to withdraw attorney Mark C. Moench of Salt Lake City [97-1]; motion for attorney Teresa Silcox to appear pro hac vice [96-1] (sh)
130	3/9/92	MOTION by defendant Maxwell C. Anderson to extend time to answer complaint. (sh)
131	3/9/92	MOTION by defendant Robert Galbasin-pro se - to extend time to answer complaint. (sh)
132	3/9/92	ORDER by Judge Lewis T. Babcock granting Meridian Oil's motion for leave to

Sub #	Date	Description
		respond by 3/20/92 to Joint Motion of Plf and Deft Amoco Prod Co. [128-1] (cc: all counsel); entry date 3/10/92 (sh) [Entry date 03/10/92]
133	3/9/92	ORDER FOR RULE 16 CONFERENCE by Judge Lewis T. Babcock; rule 16 conference set for 9:00 a.m. on 4/24/92; the proposed Case Management Order No. 1 will be considered at that time; no further responses to the Complaint are required of any deft (other than the named oil company defts and the Federal Defts) until further order of court; no party shall initiate discovery without having first obtained court order, and any outstanding discovery proceedings are stayed until further court order. (c: all counsel) (sh) [Entry date 03/10/92]
134	3/9/92	MINUTE ORDER: by Judge Lewis T. Babcock granting Edwin L. McKelvey's motion to extend time to 3/26/92 to answer Complaint [127-1]. (cc: all counsel); entry date: 3/10/92 (sh) [Entry date 03/10/92]
135	3/10/92	RESPONSE (OPPOSITION) by defendant Conoco, Inc. to Joint motion for hearing (to set scheduling conf) [112-1], for consideration of Proposed Case Managment Order No. 1, and motion to stay responses of individuals to the complaint [112-2] (sh)
136	3/11/92	ACCEPTANCE / ACKNOWLEDGEMENT OF SERVICE by defendant James M. Raymond mailed on 2/28/92; signed by James M. Raymond, individually and as Trustee for the Corinne Miller Gay Trust and Maydell Miller Mast Trust. (sh)

Sub #	Date	Description
137	3/11/92	ATTORNEY APPEARANCE for defendant DOI, defendant BIA, defendant BLM, defendant Minerals Mgt Service, defendant Eddie F. Brown, defendant Delos Cy Jamison, defendant Scott S. Sewell, defendant Manuel Lujan Jr. by William G. Pharo, Thornton Withers Field (sh) [Entry date 03/12/92]
138	3/11/92	MOTION by Federal defendants to extend time to 4/15/92 to answer Plf's Complaint (sh) [Entry date 03/12/92]
139	3/12/92	MINUTE ORDER: by Judge Lewis T. Babcock granting Deft Galbasin's motion to extend time to answer complaint [131-1]; granting Deft. Maxwell Anderson's motion to extend time to answer complaint [130-1]. (cc: all counsel); entry date 3/13/92 (sh) [Entry date 03/13/92]
140	3/13/92	JOINDER by defendant Turner Securities, defendant Louis M. Cummins, defendant Maxwell C. Anderson re Joint Motion motion for hearing (to set scheduling conf) [112-1], for consideration of proposed case management order no. 1, and for motion to stay responses of individuals to the complaint [112-2] (sh) [Entry date 03/16/92]
141	3/13/92	JOINDER by defendant Bowen/Edwards Assoc re Joint motion for hearing (to set scheduling conf) [112-1], for consideration of proposed case management order no. 1, and motion to stay responses of individuals to the complaint [112-2] (sh) [Entry date 03/16/92]
142	3/16/92	JOINDER by defendant—Mobil Oil Corp in support of motion for hearing (to set scheduling conf) [112-1], re motion to stay responses of individuals to the complaint [112-2] (sh) [Entry date 03/18/92]

Sub #	Date	Description
143	3/16/92	MOTION by plaintiff Southern Ute Indian for leave to respond to the motions for more definite statement or dismissal for failure to state a claim submitted by Amax, Meridian and Pablo. (sh) [Entry date 03/18/92]
144	3/16/92	RESPONSE by plaintiff Southern Ute Indian to Pablo's motion for more definite statement [126-1], motion to dismiss for failure to state a claim [126-2]; and response to Amax, Meridian's motion for more definite statement [111-1], motion to dismiss for failure to state a claim. [111-2] (sh) [Entry date 03/18/92]
145	3/16/92	ORDER by Judge Lewis T. Babcock granting Plf's motion for leave to respond to the motions for more definite statement or dismissal for failure to state a claim submitted by Amax, Meridian and Pablo. [143-1] (cc: all counsel); entry date: 3/18/92 (sh) [Entry date 03/18/92]
146	3/17/92	STATEMENT by defendant Anthony F. Zarlengo in support of Case Management Order No. 1 [112-1], [112-2]. (sh) [Entry date 03/18/92]
147	3/17/92	JOINDER by defendant North Central Oil re motion for hearing (to set scheduling conf) [112-1], consideration of Proposed Case Management Order No. 1, and motion to stay responses of individuals to the complaint [112-2]. (sh) [Entry date 03/18/92]
148	3/20/92	RESPONSE (Opposition) by defendant Meridian Oil, Inc. to motion for hearing (to set scheduling conf) [112-1], motion to stay responses of individuals to the complaint [112-2]. (sh) [Entry date 03/23/92]

Sub #	Date	Description
148	3/20/92	MOTION by defendant Meridian Oil, Inc. to vacate or modify Initial Scheduling Order. (sh) [Entry date 03/23/92]
149	3/20/92	MOTION by defendant McKenzie Methane to extend time to answer the Plf's Complaint to 4/13/92. (sh) [Entry date 03/23/92]
150	3/23/92	MINUTE ORDER: by Judge Lewis T. Babcock granting McKenzie Methane's motion to extend time to answer Plf's Complaint to 4/13/92. [149-1] (cc: all counsel); entry date 3/23/92 (sh)
151	3/23/92	Second MOTION by defendant Tiffany Gas Company to extend time to 5/6/92 to answer/otherwise respond to Complaint. (sh)
152	3/23/92	ANSWER by defendant Palo Petroleum, Inc. to Plf's complaint [1-1]. (sh)
153	3/23/92	JOINDER by defendant Palo Petroleum, Inc. re motion for hearing (to set scheduling conf) [112-1], re motion to stay responses of individuals to the complaint [112-2]. (sh)
154	3/23/92	ANSWER by defendant Bowen/Edwards Assoc. to Plf's complaint [1-1]. (sh) [Entry date 03/24/92]
155	3/23/92	MOTION by defendant Conoco, Inc. for leave of court to propound interrogs and document requests to plf. (sh) [Entry date 03/24/92]
156	3/24/92	CERTIFICATE of Mailing for Proposed Order Granting Conoco Inc's Motion for Leave of Court to Propound Interrogs and Document Requests of Plf. (sh)

Sub #	Date	Description
157	3/25/92	RESPONSE by plaintiff Southern Ute Indian to McKenzie Methane's motion to extend time to answer the Plf's Complaint to 4/13/92. [149-1] (sh)
158	3/26/92	MOTION by defendant Amax Oil & Gas, Inc., defendant Meridian Oil, Inc., defendant Pablo Operating Co for leave to file reply of Plf's Motion seeking leave to respond to the motions for more definite statement or dismissal for failure to state a claim submitted on behalf of Amax, Meridian and Pablo. (sh) [Entry date 03/27/92]
159	3/26/92	REPLY by defendant Amax Oil & Gas, Inc., defendant Meridian Oil, Inc., defendant Pablo Operating Co to Plf's response to Pablo's motion for more definite statement [126-1], motion to dismiss for failure to state a claim [126-2], and Meridian/Amax's motion for more definite statement [111-1], motion to dismiss for failure to state a claim. [111-2] (sh) [Entry date 03/27/92]
160	3/27/92	RETURN OF SERVICE of Summons and Complaint upon defendant Heirs of Horace Buchanan on 3/12/92, by hand delivery to Jay F. Buchanan. (sh)
161	3/30/92	ACCEPTANCE / ACKNOWLEDGEMENT OF SERVICE by defendant Charles Kettering mailed on 2/28/92; signed by Charles W. Kettering on 3/12/92. (sh)
162	3/30/92	ORDER by Judge Lewis T. Babcock granting motion for leave to file reply to Plf's Motion seeking leave to respond to the motions for more definite statement or dismissal for failure to state a claim submitted on behalf of Amax, Meridian and Pablo. [158-1] (cc: all counsel); entry date 3/30/92 (sh)

Sub #	Date	Description
163	3/30/92	ORDER by Judge Lewis T. Babcock granting Tiffany Gas Co.'s motion to extend time to 5/6/92 to answer/otherwise respond to Complaint. [151-1] (cc: all counsel); entry date: 3/30/92 (sh)
164	3/31/92	Opposition by defendant Meridian Oil, Inc. to Tribe and Amoco proposed order re: joint stipulated plan and schedule for discovery and re: motion for hearing (to set scheduling conf) [112-1] (yk) [Entry date 04/01/92]
165	3/31/92	MOTION by defendant Meridian Oil, Inc. for leave to file oppostion to proposed order re: stipulated plan and schedule for discovery (yk) [Entry date 04/01/92]
166	4/1/92	ORDER by Judge Lewis T. Babcock granting Meridian's motion for leave to file oppostion to proposed order re: stipulated plan and schedule for discovery [165-1]. (cc: all counsel); entry date 4/2/92 (sh) [Entry date 04/02/92]
167	4/3/92	MOTION by plaintiff Southern Ute Indian for leave to respond to Opposition of Defts to Joint Moiont and Motion of Deft Meridian Oil to Vacate or Modify Initial Scheduling Order. (sh) [Entry date 04/06/92]
168	4/3/92	REPLY by plaintiff Southern Ute Indian to Deft Meridian Oil's response to joint motion for hearing (to set scheduling conf) [112-1], motion to stay responses of individuals to the complaint [112-2]. (sh) [Entry date 04/06/92]
168	4/3/92	RESPONSE by plaintiff Southern Ute Indian to Meridian Oil's motion to vacate or modify Initial Scheduling Order [148-1]. (sh) [Entry date 04/06/92]

Sub #	Date	Description
169	4/3/92	REPLY by defendant Amoco Production Co to Opposition response of Deft Meridian Oil to joint motion for hearing (to set scheduling conf) [112-1], motion to stay responses of individuals to the complaint [112-2]. (sh) [Entry date 04/06/92]
169	4/3/92	RESPONSE by defendant Amoco Production Co to Meridian Oil's motion to vacate or modify Initial Scheduling Order [148-1]. (sh) [Entry date 04/06/92]
170	4/6/92	ACCEPTANCE / ACKNOWLEDGEMENT OF SERVICE by defendant Rita M. Adkins mailed on 2/27/92; signed by Rita M. Adkins on 3/25/92. (sh)
171	4/6/92	MOTION by plaintiff Southern Ute Indian for leave to respond to Deft Conoco, Inc.'s motion for leave of court to propound interrogs and document requests to plf. (sh)
172	4/6/92	RESPONSE by plaintiff Southern Ute Indian to Conoco's motion for leave of court to propound interrogs and document requests to plf [155-1]. (sh)
173	4/6/92	MOTION by plaintiff Southern Ute Indian to supplement Case Management Order No. 1. (sh)
174	4/8/92	MOTION by defendant Conoco, Inc. for leave to reply to plf Southern Ute response to def Conoco mtn incorporating legal authority for leve to propound interrogs and doc requests to plf (yk) [Entry date 04/09/92]
179	4/9/92	MOTION by defendant McKenzie Methane to extend time to 5/3/92 to answer plf's complaint. (sh) [Entry date 04/10/92]
180	4/9/92	ORDER by Judge Lewis T. Babcock referring case to Magistrate Judge Donald E. Abram for discovery and pretrial and set-

Sub #	Date	Description
		tlement. On 4/24/92 at 9:00 a.m. the court will consider the entry and terms of a case management order. (cc: to counsel) (sh) [Entry date 04/10/92]
175	4/10/92	ATTORNEY APPEARANCE for defendant JM Huber Corporation by Lon Abadie (yk)
176	4/10/92	RETURN OF SERVICE of Summons and Complaint upon Peter Turner, office manager of defendant Turner Securities on 4/3/92 (yk)
177	4/10/92	RETURN OF SERVICE of Summons and Complaint upon Susan Payne, daughter of defendant Harold F. Payne Jr. on 4/1/92 (yk)
178	4/10/92	RETURN OF SERVICE of Summons and Complaint upon Charles Onofrio, legal counsel for defendant Margaret Crow on 4/2/92 (yk)
181	4/10/92	MOTION by defendant Conoco, Inc. to submit objection in excess of page limitation. (sh) [Entry date 04/13/92]
182	4/10/92	OBJECTIONS by defendant Conoco, Inc. to Joint Motion of Plf/Amoco re motion for hearing (to set scheduling conf) [112-1], motion to stay responses of individuals to the complaint [112-2] and Case Management Order No. 1 re certification of this case as a class action and designation of any party as a class representative. (sh) [Entry date 04/13/92]
183	4/13/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Carbone Investment on 4/6/92 by hand delivery to John A. Carbone, Jr., Registered Agent. (sh)

Sub #	Date	Description
184	4/13/92	ACCEPTANCE / ACKNOWLEDGEMENT OF SERVICE upon defendant Union TX Petroleum mailed on 3/27/92; signed by (name illegible), Associate Counsel on 3/31/92. (sh)
185	4/13/92	RETURN OF SERVICE of Summons and Complaint and several other documents upon defendant Tillie Flaks on 4/7/92, by hand delivery to Charles J. Jacobs, Esq., legal counsel for Tillie Flaks. (sh)
186	4/13/92	RETURN OF SERVICE of Summons and Complaint and several other documents upon defendant Minnie Flaks on 4/7/92 by hand delivery to Charles J. Jacobs, Esq., legal counsel for Minnie Flaks. (sh)
187	4/13/92	ACCEPTANCE / ACKNOWLEDGEMENT OF SERVICE of defendant Sally M. Etterbeck mailed on 2/27/92; signed by Sally M. Etterbeck on 3/5/92. (sh)
188	4/13/92	RETURN OF SERVICE of Summons and Complaint and several other documents upon defendant John Crow Jr. on 4/2/92. (sh)
189	4/13/92	MINUTE ORDER: by Judge Lewis T. Babcock granting McKenzie Methane Corp's motion to extend time to 5/3/92 to answer plf's complaint [179-1]; denying Conoco's motion for leave to reply to plf Southern Ute response to def Conoco mtn incorporating legal authority for leave to propound interrogs and doc requests to plf [174-1]. (cc: all counsel); entry date 4/15/92 (sh) [Entry date 04/15/92]
190	4/14/92	OBJECTIONS by defendant Richmond Petroleum to Plf's motion to supplement Case Management Order No. 1 [173-1]. (sh) [Entry date 04/15/92]

Sub #	Date	Description
191	4/14/92	RESPONSE by defendant Fuel Resources Dev for Plf's/Amoco's Joint motion for hearing (to set scheduling conf) [112-1], motion to stay responses of individuals to the complaint [112-2]. (sh) [Entry date 04/15/92]
192	4/14/92	RESPONSE by Federal defendants to Plf/ Amoco's Joint motion for hearing (to set scheduling conf) [112-1], motion to stay responses of individuals to the complaint [112-2]. (sh) [Entry date 04/15/92]
193	4/14/92	MOTION by defendant Meridian Oil, Inc. to file objections to Proposed Case Management Order No. 1 to exceed page limitation. (sh) [Entry date 04/15/92]
194	4/14/92	OBJECTIONS by defendant Meridian Oil, Inc. to Proposed Case Management Order No. 1 which is part of the motion for hearing (to set scheduling conf) [112-1], motion to stay responses of individuals to the complaint [112-2]. (sh) [Entry date 04/15/92]
195	4/14/92	MOTION by defendant to extend time to 5/30/92 to answer Plf's Complaint. (sh) [Entry date 04/15/92]
196	4/16/92	MINUTE ORDER : by Magistrate Judge Donald E. Abram ; counsel directed to report to Mag. Abram's chambers for a status conf after completion of the Rule 16 conference scheduled before Judge Babcock 9:00 a.m. on 4/24/92. (cc: all counsel) ; entry date : 4/17/92 (sh) [Entry date 04/17/92]
197	4/17/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Thomas C. Romolo on 4/6/92. (sh)

Sub #	Date	Description
198	4/17/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Abel S. Gallegos on 4/9/92. (sh)
199	4/17/92	MINUTE ORDER : by Judge Lewis T. Babcock granting Meridian Oil's motion to file objections to Proposed Case Management Order No. 1 to exceed page limitation [193-1]. (cc: all counsel) ; entry date : 4/20/92 (sh) [Entry date 04/20/92]
200	4/20/92	MOTION by plaintiff Southern Ute Indian for leave to respond to Deft McKenzie Methane's req for extension of time. (sh) [Entry date 04/21/92]
201	4/20/92	RESPONSE by plaintiff Southern Ute Indian to McKenzie Methane's motion to extend time to 5/3/92 to answer plf's complaint [179-1]. (sh) [Entry date 04/21/92]
202	4/20/92	ANSWER by defendant Union TX Petroleum to Plf's complaint [1-1]. (sh) [Entry date 04/21/92]
203	4/20/92	MOTION by defendant Union TX Petroleum for more definite statement, or to dismiss for failure to state a claim. (sh) [Entry date 04/21/92]
204	4/20/92	STATEMENT—Joint Submission of Order Re: Joint Stipulated Plan and Schedule for Discovery by plaintiff Southern Ute Indian, defendant Amoco Production Co. (Exhibit A is the Proposed Order and has been sent to Judge Babcock's chambers for his signature.) (sh) [Entry date 04/21/92]
205	4/21/92	RESPONSE by defendant Amoco Production Co, to objections to proposed Case Management Order—responding to specific objections of Meridian Oil Co. [194-1], Fuel

Sub #	Date	Description
		Resources Response to Joint Motion [191-1], and Conoco's Objections [182-1]. (sh) [Entry date 04/22/92]
206	4/21/92	MINUTE ORDER : by Judge Lewis T. Babcock granting Plf's motion for leave to respond to Deft McKenzie Methane's req for extension of time [200-1]. (cc: all counsel) ; entry date : 4/22/92 (sh) [Entry date 04/22/92]
207	4/22/92	CERTIFICATE of Compliance by plaintiff Southern Ute Indian indicating compliance with Court's Initial Scheduling Order directing Plf to furnish copies of the Initial Scheduling Order, the proposed Case Management Order No. 1, the Joint Motion and the proposed Order Re: Joint Stipulated Plan and Schedule for Discovery to all defts. (sh) [Entry date 04/23/92]
208	4/22/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant William Kemp Clark on 4/14/92. (sh) [Entry date 04/23/92]
209	4/22/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Heirs of Kelly Cox (to Trustee for Kelly Cox Testamentary Trust) on 4/14/92. (sh) [Entry date 04/23/92]
210	4/22/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Ruby Gibbs Goggans on 4/13/92. (sh) [Entry date 04/23/92]
211	4/22/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Suzanne Heath Manges on 4/14/92 by hand delivery to Jettye Dreggors, Vice President, Nationsbank, as Agent for Suzanne Manges. (sh) [Entry date 04/23/92]

Sub #	Date	Description
212	4/22/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Heirs of J. L. Tatum on 4/15/92 by hand delivery to Paul A. Midkiff, Vice President, NationsBank Trustee for the Mary A. Tatum Trust. (sh) [Entry date 04/23/92]
213	4/22/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Heirs of J. L. Tatum on 4/15/92 by hand delivery to Paul A. Midkiff, Vice President, NationsBank, agent for Tatum Family Agency No. 426901. (sh) [Entry date 04/23/92]
214	4/22/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Heirs of J. L. Tatum on 4/15/92 by hand delivery to Paul A. Midkiff, Vice President, NationsBank, as agent for Robert S. Tatum Family Agency 426900. (sh) [Entry date 04/23/92]
215	4/22/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Heirs of W. A. Moncrief on 4/15/92 by hand delivery to Melvin May, attorney and authorized agent of the executors of the will of W. A. Moncrief. (sh) [Entry date 04/23/92]
216	4/22/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Heirs of H. A. Harmon on 4/13/92 by hand delivery to Nancy H. Harmon, heir of H.A. Harmon. (sh) [Entry 04/23/92]
217	4/22/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Heirs of Maurice C. Breen on

Sub #	Date	Description
		4/8/92 by hand delivery to Timothy Breen. (sh) [Entry date 04/23/92]
218	4/23/92	MOTION by Ralph Wheeler, C. E. Wheeler to intervene, and for order designating intervenors as class representatives. (sh) [Entry date 04/24/92]
219	4/23/92	MOTION by defendant Meridian Oil, Inc. for leave to file objections to Motion to Supplement Case Management Order No. 1. (sh) [Entry date 04/24/92]
220	4/23/92	OBJECTIONS by defendant Meridian Oil, Inc. to Plf's motion to supplement Case Management Order No. 1 [173-1]. (sh) [Entry date 04/24/92]
221	4/23/92	ATTORNEY APPEARANCE for defendant Tiffany Gas Company by Hugh V. Schaefer. (sh) [Entry date 04/24/92]
222	4/23/92	MOTION by plaintiff Southern Ute Indian for leave to respond to Federal Defts' Motion for Enlargement of Time. (sh) [Entry date 04/24/92]
223	4/23/92	RESPONSE by plaintiff Southern Ute Indian to Federal Defts' motion to extend time to 5/30/92 to answer Plf's Complaint [195-1]. (sh) [Entry date 04/24/92]
224	4/23/92	MINUTE ORDER: by Judge Lewis T. Babcock granting Federal Defts' motion to extend time to 5/30/92 to answer Plf's Complaint [195-1]. (cc: all counsel); entry date: 4/24/92 (sh) [Entry date 04/24/92]
225	4/24/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Katherine Frances McElvain Harvey on 4/21/92. (sh)

Sub #	Date	Description
226	4/24/92	ACCEPTANCE / ACKNOWLEDGEMENT OF SERVICE by defendant Katherine B. McElvain served on 4/21/92; signed by Thornton H. McElvain, Jr. pursuant to copy of Power of Attorney attached. (sh)
227	4/24/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Thornton H. McElvain Jr. on 4/21/92. (sh)
228	4/24/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Henry Ashworth on 4/20/92. (sh)
229	4/24/92	SCHEDULING ORDER Judge Lewis T. Babcock; Discovery cutoff set for 4/26/93 (re Class Action Claim/defenses); rule 16 conf held 9:00 4/24/92. (cc: all counsel) (sh)
230	4/24/92	CASE MANAGEMENT ORDER NO. 1 by Judge Lewis T. Babcock; another rule 16 conference set for 2:00 p.m. on 6/19/92. Sets forth Class Issues, Discovery and Further Proceedings, and the Next Conference. (cc: all counsel); entry date 4/24/92 (sh)
231	4/24/92	ORDER by Judge Lewis T. Babcock granting Plf's motion to supplement Case Management Order No. 1 [173-1]—Supplement to Case Management No. 1 (cc: all counsel); entry date 4/24/92 (sh)
232	4/24/92	SUPPLEMENTAL Order of Reference [180-1]—to Mag. Abram to form a steering committee, selecting liaison counsel to disburse court notices and orders, process the equitable sharing of attorney fees/costs among defts, and supervise Plf's discovery efforts to compile a list of absent class members and drafting of notice to them. (sh)

Sub #	Date	Description
233	4/24/92	COURTROOM MINUTES by Judge Lewis T. Babcock granting Case Management Order #1 [112-1] with these changes: Paragraph 7: other named defts reserve right to present evidence at trial of bifurcated issues; USA permitted to participate in discovery; Paragraph 11: 2nd line—Strike "and Federal Defts", add: any deft is granted leave to answer complaint; Paragraph 12: amend to: except motions going to jurisdiction of court. Status Conf set 6/19/92 at 2:00 p.m. (for 2 hours). Case Management Order #1 includes Order to certify class as stated in order, and Order to bifurcate as stated in the order. Court amends paragraph 7A of Supplemental Order: Plf to bear discovery costs and will reimburse oil company defts 25% of those deft's title costs expended for records and title data used to prepare the notice lsit. Court signs Joint Stipulated Plan and Schedule for Discovery. Court to issue supplemental Order of Reference to Chief Mag. Abram [180-1]. Court reserves ruling on issues of severance tax and on question of ongoing operations. Plf to file motion/brief on administering the severance tax within 10 days; defts to respond 10 days thereafter. Plf to reply 10 days thereafter. Same briefing schedule re Fuelco's brief filed 4/14/92 re equitable relief pending good/bad faith issues, determination. entry date : 4/30/92 (sh) [Entry date 04/30/92]
234	5/1/92	RETURN OF SERVICE of Summons and Complaint upon / by defendant Margaret C. Pargin on 4/17/92 (yk)

Sub #	Date	Description
235	5/1/92	RETURN OF SERVICE of Summons and Complaint upon / by defendant Myra Theresa Moulds on 4/17/92 (yk)
236	5/1/92	RETURN OF SERVICE of Summons and Complaint upon / by defendant John David Mosbacher on 4/20/92 (yk)
237	5/1/92	RETURN OF SERVICE of Summons and Complaint upon Barbara Sena, process Clk for Corporation Co agent for defendant Hondo Oil & Gas Co on 4/20/92 (yk)
238	5/1/92	ANSWER by defendant North Central Oil complaint [1-1] (yk) [Entry date 05/04/92]
239	5/4/92	MOTION by plaintiff Southern Ute Indian, defendant McKenzie Methane to stay responsive pleading requirement pending settlement approval (lm) [Entry date 05/06/92]
240	5/6/92	TRANSCRIPT of proceedings (Hearing Re Case Management Order and Rule 16) before Judge Babcock on 4/24/92 pgs 1-81 (cert-copy) (lm)
241	5/6/92	ANSWER by defendant Tiffany Gas Company to Plf's complaint [1-1]. (sh) [Entry date 05/08/92]
242	5/6/92	ORDER by Judge Lewis T. Babcock granting Plf/McKenzie Methane's motion to stay responsive pleading requirement pending settlement approval [239-1]. (cc: all counsel) ; entry date : 5/8/92 (sh) [Entry date 05/08/92]
243	5/8/92	BRIEF FILED by plaintiff Southern Ute Indian re: Continuing Coalbed Methane Operations during Pendency of this Action. (sh) [Entry date 05/11/92]

Sub #	Date	Description
244	5/8/92	MOTION by plaintiff Southern Ute Indian to file brief re preliminary severance tax issues that exceeds page limitation. (sh) [Entry date 05/11/92]
245	5/8/92	BRIEF FILED by plaintiff Southern Ute Indian re Preliminary Severance Tax Issues. (sh) [Entry date 05/11/92]
246	5/11/92	MINUTE ORDER: by Judge Lewis T. Babcock granting Plf's motion to file brief re preliminary severance tax issues that exceeds page limitation [244-1]. (cc: all counsel); entry date: 5/12/92 (sh) [Entry date 05/12/92]
247	5/15/92	MOTION by plaintiff Southern Ute Indian for reconsideration of the Court's 4/24/92 order re allocation of costs for discovery of names & addresses of the deft class. (sh) [Entry date 05/18/92] [Edit date 05/18/92]
248	5/15/92	BRIEF by plaintiff Southern Ute Indian in support of motion for reconsideration of the Court's 4/24/92 order re allocation of costs for discovery of names & addresses of the deft class [247-1]. (sh) [Entry date 05/18/92]
249	5/15/92	CERTIFICATE of Service by plaintiff Southern Ute Indian—mailing copies of the Motion to Reconsider Allocation of Costs and the Memo in Support thereof. (sh) [Entry date 05/18/92]
250	5/19/92	ATTORNEY APPEARANCE for defendant Palo Petroleum, Inc. by Robert C. Hawley. (sh) [Entry date 05/20/92]
251	5/20/92	MOTION by defendant Amoco Production Co to extend time to 6/14/92 to respond

Sub #	Date	Description
		to Plf's motion to reconsider allocation of costs and advice re notice list. (sh) [Entry date 05/21/92]
252	5/21/92	MOTION by defendant Palo Petroleum, Inc. to withdraw attorney James Bruce and William P. Gosdman. (sh)
253	5/21/92	NOTICE of Withdrawal of attorneys to defendant Palo Petroleum, Inc. (sh)
254	5/21/92	MINUTE ORDER: by Judge Lewis T. Babcock granting Amoco's motion to extend time for 20 days to respond to Plf's motion to reconsider allocation of costs and advice re notice list. [251-1] (cc: all counsel); entry date: 5/22/92 (sh) [Entry date 05/22/92]
255	5/22/92	MOTION by defendant Richmond Petroleum to file response brief re preliminary severance tax issues that exceeds page limitation. (sh)
256	5/22/92	RESPONSE by defendant Richmond Petroleum to Plfs brief re Preliminary Severance Tax Issues [245-1]. (sh)
257	5/22/92	JOINDER by defendant Palo Petroleum, Inc. re Amoco's motion to extend time to 6/4/92 to respond to Plf's motion to reconsider allocation of costs and advice re notice list [251-1]. (sh) [Entry date 05/26/92]
258	5/22/92	MOTION by defendant Amoco Production Co to file brief to Plf's 2 briefs to exceed page limitation. (sh) [Entry date 05/26/92]
259	5/22/92	RESPONSE by defendant Amoco Production Co, to brief [245-1] re interim relief that should be provided during the pend-

Sub #	Date	Description
		ency of the litiation for ongoing oil and gas operations and brief [243-1] re severance tax payments. (sh) [Entry date 05/26/92]
260	5/28/92	MINUTE ORDER: by Judge Lewis T. Babcock granting Amoco's motion to file brief to Plf's 2 briefs to exceed page limitation [258-1]. Granting Richmond's motion to file response brief re preliminary severance tax issues that exceeds page limitation [255-1]. (cc: all counsel); entry date: 5/28/92 (sh)
261	5/28/92	JOINDER by defendant Richmond Petroleum in Amoco's motion to extend time to 6/4/92 to respond to Plf's motion to reconsider allocation of costs and advice re notice list [251-1]. (sh) [Entry date 05/29/92]
262	6/1/92	ANSWER by defendant Katherine B. McElvain, defendant Thornton H. McElvain Jr., defendant Katherine Frances McElvain Harvey to Plf's complaint [1-1]. The Certificate of Service was not signed or dated. (sh) [Entry date 06/02/92] [Edit date 06/02/92]
263	6/3/92	MINUTE ORDER: by Judge Lewis T. Babcock re Defts have to 6/23/92 to respond to Plf's Motion to Reconsider Allocation of Costs [247-1]. (cc: all counsel); entry date: 6/4/92 (sh) [Entry date 06/04/92]
264	6/4/92	RETURN OF SERVICE of Summons and Complaint upon Heirs of defendant George C. Vance, Deceased on 5/26/92 by hand delivery to Greg Schlepp, Authorized Agent for Service. (sh)

Sub #	Date	Description
265	6/4/92	RETURN OF SERVICE of Summons and Complaint upon defendant McMurry Oil Company on 5/26/92 by hand delivery to John Martin, Registered Agent. (sh)
266	6/4/92	RETURN OF SERVICE of Summons and Complaint upon defendant W. R. McMahon on 5/21/92. (sh)
267	6/4/92	RETURN OF SERVICE of Summons and Complaint upon defendant Dorothy N. McKelvey on 5/21/92. (sh)
268	6/4/92	RETURN OF SERVICE of Summons and Complaint upon defendant Hyde Oil Gas Corp on 5/21/92 by hand delivery to C. Brodie Hyde. (sh)
269	6/4/92	BRIEF by defendant Amoco Production Co in opposition to Plf's motion for reconsideration of the Court's 4/24/92 order re allocation of costs for discovery of names & addresses of the deft class [247-1]. (sh) [Entry date 06/05/92]
270	6/8/92	MOTION by plaintiff Southern Ute Indian to exceed page limitation in filing reply brief re interim relief affecting ongoing oil and gas operations and severance tax payments. (sh) [Entry date 06/09/92]
271	6/8/92	REPLY by plaintiff Southern Ute Indian re Brief [245-1], re Brief [243-1] re interim relief affecting ongoing oil and gas operations and severance tax payments. (sh) [Entry date 06/09/92]
272	6/8/92	ORDER by Judge Lewis T. Babcock granting Palo Petroleum's motion to withdraw attorney James Bruce and William P. Gosdman. [252-1] Withdrawing attorney James Garrett Bruce for Palo Petroleum, Inc.,

Sub #	Date	Description
		attorney William P. Godsman for Palo Petroleum, Inc. (cc: all counsel); entry date: 6/9/92 (sh) [Entry date 06/09/92]
273	6/8/92	MINUTE ORDER: by Judge Lewis T. Babcock granting Plf's motion to exceed page limitation in filing reply brief re interim relief affecting ongoing oil and gas operations and severance tax payments [270-1]. (cc: all counsel); entry date: 6/9/92 (sh) [Entry date 06/09/92]
274	6/9/92	ORDER by Magistrate Judge Donald E. Abram re Supplemental Order of Reference [232-1], the steering committee of the defts to consist of: Amoco Prod Co., Meridian Oil, Conoco Oil, Justice Dept., Wheeler Landowners rep, Verce Landowners rep, and Fuel Resources Development Co. Lead counsel to be David E. Brody, and Thomas S. Nichols. The Notice of Pendency of Class Action and Rights of Class Members is approved by the Court. Status Conf set for 8:30 a.m. on 7/27/92. (cc: all counsel); entry date: 6/10/92 (sh) [Entry date 06/10/92]
274	6/9/92	NOTICE of Pendency of Class Action and of Rights of Class Members approved by Court. (sh) [Entry date 06/10/92]
275	6/11/92	AFFIDAVIT of Kevin J. Kilstrom regarding Brief response [259-1] on Interim Relief that Should be Provided During the Pendency of the Litigation for Ongoing Oil and Gas Operations and Severance Tax Payments. (This document is the original Affidavit. A copy of the Affidavit was attached to the original response.) (sh) [Entry date 06/15/92]

Sub #	Date	Description
276	6/12/92	Joint STATUS REPORT by plaintiff Southern Ute Indian; defendant Amoco Production Co. (sh) [Entry date 06/15/92]
277	6/12/92	REPLY by plaintiff Southern Ute Indian re Richmond Petroleum's Response Brief [256-1] to Preliminary Severance Tax Issues [245-1] brief. (sh) [Entry date 06/15/92]
278	6/12/92	RETURN OF SERVICE of Summons and Complaint upon defendant R. Franklin McKelvey on 5/22/92. (sh) [Entry date 06/15/92]
279	6/18/92	Notice of Filing Supplemental AFFIDAVIT of John Hasche in further support of Amoco's response in opposition to Pltf's motion to reconsider allocation of costs [269-1] (gc)
280	6/19/92	COURTROOM MINUTES by Judge Lewis T. Babcock; Rule 16/Status Conference held 2:00 6/19/92; In Court Hearing set for 10:00 a.m. on 8/21/92 to hear all pending motions (2 hours). USA to file responsive pleading to the Complaint [1-1] within 30 days. Plf to file reply to Motion for Reconsideration of Allocation of Costs [247-1] by 6/23/92 at 5:00 p.m. Plf and Defts agree to submit Motion for Reconsideration on the briefs. entry date: 6/24/92 (sh) [Entry date 06-24-92]
281	6/23/92	REPLY by plaintiff Southern Ute Indian to Amoco's response to motion for reconsideration of the Court's 4/24/92 order re allocation of costs for discovery of names & addresses of the deft class [247-1]. (sh) [Entry date 06/24/92]
282	6/24/92	ORDER by Judge Lewis T. Babcock granting Joint motion for entry of Case Manage-

Sub #	Date	Description
		ment No. 1 [112-1]; granting Plf's motion to supplement Case Management Order No. 1 [173-1]. (Nunc pro tunc 4/24/92.) (cc: all counsel); entry date: 6/24/92 (sh)
283	6/24/92	ORDER by Judge Lewis T. Babcock denying Plf's motion for reconsideration of the Court's 4/24/92 order re allocation of costs for discovery of names & addresses of the deft class [247-1]. (cc: all counsel); entry date: 6/24/92 (sh)
284	6/26/92	MOTION by plaintiff Southern Ute Indian to extend time to respond to Amoco's First set of interrogs to Plf and Amoco's First req for prod of documents. (sh)
285	6/26/92	MOTION by plaintiff Southern Ute Indian for (limited Settlement Conference) hearing. (sh)
286	6/26/92	Witness list (Designation of Witnesses in Response to Notice of Limited Deposition Under rule 30(b)(6) Submitted by Amoco Prod Co.) submitted by plaintiff Southern Ute Indian (sh)
287	6/26/92	MOTION by defendant Amoco Production Co to extend 7/29/92 to respond to Plf's discovery (sh) [Entry date 06/29/92]
288	6/29/92	STATEMENT by defendant Markwest Energy Prt in support of Plf's motion for (limited Settlement Conference) hearing [285-1]. (sh)
289	6/30/92	MOTION by defendant Palo Petroleum, Inc. to exceed page limitation in filing its Brief Re Relief Affecting Oil and Gas Operations and severance Tax Payments. (sh) [Entry date 07/01/92]

Sub #	Date	Description
290	6/30/92	BRIEF FILED by defendant Palo Petroleum, Inc. regarding Plf's Brief re Severance Tax Payments [245-1], and regarding Ongoing Oil and Gas Operations [243-1]. (sh) [Entry date 07/01/92]
291	7/1/92	RETURN OF SERVICE of Summons and Complaint upon defendant J. M. Eakes on 5/29/92 by hand delivery to David Hersch, his conservator. (sh) [Entry date 07/02/92]
292	7/1/92	RETURN OF SERVICE of Summons and Complaint and other documents upon defendant Helen Miller on 6/19/92 by hand delivery to Reese Miller for the heirs of Helen L. Miller. (sh) [Entry date 07/02/92]
293	7/1/92	RETURN OF SERVICE of Summons and Complaint upon defendant Hardin Simmons Univ on 6/12/92 by hand delivery to Bill Tippen, Registered Agent. (sh) [Entry date 07/02/92]
294	7/2/92	Opposition of Federal Defendants' to Tribe's request to Chief Magistrate for limited settlement conference (lf) [Entry date 07/06/92]
295	7/2/92	MINUTE ORDER: by Judge Lewis T. Babcock granting motion to exceed page limitation in filing its Brief Re Relief Affecting Oil and Gas Operations and severance Tax Payments. [289-1] (cc: all counsel): entry date: 7/6/92 (lf) [Entry date 07/06/92]
296	7/6/92	NOTICE OF APPEAL by plaintiff Southern Ute Indian in re order [283-1] of 6/24/92; Notice of transcript order form

Sub #	Date	Description
		due 7/16/92; Notice mailed to all counsel on 7/7/92 (gc)
—	7/6/92	$100.00 fee and $5.00 fee paid. Receipt No 143664. re appeal [296-1] (gc)
297	7/7/92	RESPONSE in opposition by plaintiff Southern Ute Indian to Palo Petroleum's motion to exceed page limitation in filing its Brief Re Relief Affecting Oil and Gas Operations and severance Tax Payments. [289-1] (gc) [Entry date 07/08/92]
297	7/7/92	MOTION by plaintiff Southern Ute Indian to strike brief of Palo Petroleum re relief affecting ongoing oil and gas operations and severance tax payments (gc) [Entry date 07/08/92]
298	7/8/92	REPLY by plaintiff Southern Ute Indian to Federal Defts' response in opposition to motion for (limited Settlement Conference) hearing. [285-1] (gc)
299	7/9/92	Case No. 92-1201 assigned by the Court of Appeals. (gc)
300	7/13/92	ORDER by Magistrate Judge Donald E. Abram granting Amoco motion to extend time to respond to Plf's discovery. [287-1] and granting Southern Ute's motion to extend time to respond to Amoco's First set of interrogs to Plf and Amoco's First req for prod of documents [284-1], both to 7/31/92. Re: Southern Ute's request for limited settlement conf. [285-1] and Federal defts' opposition, the tribe and the Dept. of Justice are to report in writing by 7/31/92 the status of the settlement of the McKenzie Methane Corp. and Mark West Energy Partners Ltd. claims. (cc:

Sub #	Date	Description
		all counsel); entry date: 7/14/92 (gc) [Entry date 07/14/92]
301	7/16/92	NOTICE OF TRANSCRIPT ORDER FORM filed by plaintiff/appellant Southern Ute Indian; (Necessary transcript already on file) re appeal [296-1] (gc)
302	7/16/92	LETTER (Re: 296-1]) to USCA and all counsel advising that record is now complete . . . tof filed stating transcript necessary is already on file. (gc)
303	7/20/92	ANSWER by Federal Defts Manuel Lujan Jr., DOI, BIA, BLM, Minerals Mgt Service, Eddie F. Brown, Delos Cy Jamison, Scott S. Sewell complaint [1-1] (gc) [Entry date 07/21/92]
304	7/20/92	LETTER to court from counsel for defendant Conoco, Inc., defendant Pablo Operating Co. re: corrections to names of counsel, etc. (gc) [Entry date 07/21/92]
305	7/23/92	LETTER to court from Laura Lindley of Poulson, Odell and Peterson, counsel defendant North Central Oil requesting that Charles R. Pirtle's (in house counsel) name be removed from service list as this law firm is representing this deft. (gc) [Entry date 07/24/92]
306	8/3/92	Designation of Expert Witness Testimony for defendant Conoco, Inc. (gc) [Entry date 08/04/92]
307	8/3/92	Designation of Expert Witness Testimony for defendant Palo Petroleum, Inc. (gc) [Entry date 08/04/92]
308	8/3/92	Notice of Fields of Expert Witness Testimony for plaintiff Southern Ute Indian (gc) [Entry date 08/04/92]

Sub #	Date	Description
309	8/3/92	Designation of Potential Areas of Expert Witness Testimony for defendant Fuel Resources Dev, defendant Natl Coop Refinery (gc) [Entry date 08/04/92]
310	8/3/92	MOTION by defendant Phillips Petroleum for attorney Susan L. Heady to appear pro hac vice (gc) [Entry date 08/04/92]
311	8/3/92	Statement of Potential Fields of Expert Witness Testimony for defendant Phillips Petroleum (gc) [Entry date 08/04/92]
312	8/3/92	MOTION by defendant Phillips Petroleum to substitute attorneys David C. Little and Kevin J. Kuhn of Montgomery, Little, Young, Campbell and McGrew in place of George M. Paulson, Jr. (gc) [Entry date 08/04/92]
313	8/4/92	MINUTE ORDER: by Judge Lewis T. Babcock granting motion to substitute attorneys David C. Little and Kevin J. Kuhn of Montgomery, Little, Young, Campbell and McGrew in place of George M. Paulson, Jr. [312-1] . . . granting motion for attorney Susan L. Heady to appear pro hac vice [310-1] (cc: all counsel); entry date: 8/5/92 (gc) [Entry date 08/05/92]
314	8/5/92	MINUTE ORDER: by Magistrate Judge Donald E. Abram. Order of 6/9/92 [274-2] is amended to add the L.O.C.C. group to the steering committee.; Status Conferences are set 1:00 9/11/92, (Mag Conf) 1:00 10/16/92 and 11/20/92 at 1:00 pm.; Settlement Conference set 1:00 12/9/92, sch; (cc: all counsel); entry date: 8/6/92 (gc) [Entry date 08/06/92]
315	8/5/92	ORDER by Magistrate Judge Donald E. Abram. The attached Notice of Pendency

Sub #	Date	Description
		of Class Action and of Rights of Class Members submitted by the parties on 7/29/92 is approved by the court and shall be used in place of the Notice approved 6/9/92. (cc: all counsel); entry date: 8/6/92 (gc) [Entry date 08/06/92]
316	8/10/92	MOTION by Federal defendants for leave to file sur-reply to pltf Tribe's reply brief regarding interim relief affecting ongoing oil and gas operations and severance tax payments clarifying misstatements therein (gc) [Entry date 08/11/92]
—	8/10/92	Tendered Sur-reply to pltf Tribe's reply brief regarding interim relief affecting ongoing oil and gas operations and severance tax payments clarifying misstatements therein submitted by re defendant motion for leave to file sur-reply [316-1] (gc) [Entry date 08/11/92]
317	8/10/92	MINUTE ORDER: by Judge Lewis T. Babcock denying federal defts' motion for leave to file sur-reply to pltf Tribe's reply brief regarding interim relief affecting ongoing oil and gas operations and severance tax payments clarifying misstatements therein [316-1] (cc: all counsel); entry date: 8/11/92 (gc) [Entry date 08/11/92]
318	8/13/92	MOTION by defendant Mobil Oil Corp for attorney Marilyn P. Fineshriber to appear pro hac vice (gc) [Entry date 08/14/92]
319	8/14/92	ATTORNEY APPEARANCE as co-counsel for plaintiff Southern Ute Indian by Michael T. McConnell (gc)
320	8/14/92	MINUTE ORDER: by Judge Lewis T. Babcock granting motion for attorney Marilyn P. Fineshriber to appear pro hac

Sub #	Date	Description
		vice [318-1] (cc: all counsel); entry date: 8/14/92 (gc)
321	8/17/92	ATTORNEY APPEARANCE as co-counsel for plaintiff Southern Ute Indian by John Stephen Pfeiffer (gc) [Entry date 08/18/92]
322	8/20/92	NOTICE by plaintiff Southern Ute Indian of supplemental tribal court decision. (gc) [Entry date 08/21/92]
323	8/20/92	MOTION by plaintiff Southern Ute Indian to amend complaint (to correct errors in names of certain defts, substitute trustees of trusts in place of individual defts, delete names of other defts and ad defts) (gc) [Entry date 08/21/92]
—	8/20/92	Tendered First Amended Complaint submitted by plaintiff Southern Ute Indian re: motion to amend complaint (to correct errors in names of certain defts, substitute trustees of trusts in place of individual defts, delete names of other defts and add defts) [323-1] (gc) [Entry date 08/21/92]
324	8/21/92	MOTION by defendant Tiffany Gas Company for extension of time to submit title cost datea to 9/18/92 (gc) [Entry date 08/24/92]
325	8/21/92	COURTROOM MINUTES by Judge Lewis T. Babcock; In Court Hearing held 8/21/92. Court notes pltf filed a notice of appeal on 7/5/92. Court heard argument on severance tax issue and will defer ruling until issue of whether this court has jurisdiction (in light of appeal) is resolved. Demonstrative exhibit submitted (attached to minutes). Counsel to file status report

Sub #	Date	Description
		each week beginning next Friday re: court's jurisdiction re: U.S. Court of Appeals; entry date: 8/24/92 (gc) [Entry date 08/24/92]
326	8/21/92	NOTICE by defts Meridian Oil, Inc., Amax Oil & Gas, Inc., Pablo Operating Co, Palo Petroleum, Inc., Richmond Petroleum, Natl Coop Refinery, Phillips Petroleum, Amoco Production Co of submission of billings for costs and expenses for records and title data (gc) [Entry date 08/24/92]
327	8/21/92	STATEMENT by defendant Mobil Oil Corp of costs (gc) [Entry date 08/24/92]
328	8/21/92	MOTION by defendant Bowen/Edwards Assoc for extension of time to file billings for accumulating landowner's names to 9/11/92 (gc) [Entry date 08/24/92]
329	8/25/92	Amended (SUPPLEMENT) notice of submission of billsings by defendant Amoco Production Co re notice [326-1] (gc) [Entry date 08/27/92]
330	8/28/92	Joint STATUS REPORT by plaintiff Southern Ute Indian, and defendant Amoco Production Co as class representative regarding jurisdiction (gc) [Entry date 08/31/92]
331	8/31/92	ORDER by Magistrate Judge Donald E. Abram granting Tiffany Gas' motion for extension of time to submit title cost datea to 9/18/92 [324-1] (cc: all counsel); entry date: 9/2/92 (gc) [Entry date 09/02/92]
332	8/31/92	ORDER by Magistrate Judge Donald E. Abram granting Bowen/Edward Explorations' motion for extension of time to file billings for accumulating landowner's

Sub #	Date	Description
		names to 9/11/92 [328-1] (cc: all counsel); entry date: 9/2/92 (gc) [Entry date 09/02/92]
333	9/1/92	MINUTE ORDER: by Magistrate Judge Donald E. Abram finding the Tribe's motion for (limited Settlement Conference) hearing. [285-1] moot, since Dept. of Interior has acted on the settlement. (cc: all counsel); entry date: 9/3/92 (gc) [Entry date 09/03/92]
334	9/4/92	Second Joint STATUS REPORT by plaintiff Southern Ute Indian, defendant Amoco Production Co regarding jurisdiction (gc) [Entry date 09/09/92]
335	9/4/92	Consent (RESPONSE) by defendant Conoco, Inc. to motion to amend complaint (to correct errors in names of certain defts, substitute trustees of trusts in place of individual defts, delete names of other defts and add defts) [323-1] (gc) [Entry date 09/09/92]
335	9/4/92	ANSWER by defendant Conoco, Inc. to amended complaint (adopting and incorporating Conoco's answer filed 2/10/92) (gc) [Entry date 09/09/92]
336	9/8/92	Second Amended (SUPPLEMENT) by defendant Amoco Production Co, defendant Bowen/Edwards Assoc notice of submission of billings [326-1] (gc) [Entry date 09/09/92]
337	9/11/92	Third Joint STATUS REPORT Regarding Jurisdiction by plaintiff Southern Ute Indian, defendant Amoco Production Co (gc) [Entry date 09/14/92]
338	9/11/92	Letter from Susie M. Kleinman, Legal Sec., at Davis, Graham & Stubbs, counsel for

Sub #	Date	Description
		defendant Amoco Production Co with Exhibit 1 that was inadvertently not attached to the Third joint status report regarding jurisdiction filed 9/11/92 [337-1] (gc) [Entry date 09/14/92]
339	9/14/92	MOTION by defendant Richmond Petroleum to withdraw attorneys James P. Rouse and Steven F. Mueller of Burns, Wall, Smith and Mueller (gc)
340	9/14/92	NOTICE to defendant Richmond Petroleum of Withdrawal by Burns, Wall, Smith & Mueller (gc)
341	9/14/92	Consent (RESPONSE) by defendant Tiffany Gas Company to motion to amend complaint [323-1] (gc) [Entry date 09/16/92]
341	9/14/92	ANSWER by defendant Tiffany Gas Company to amended complaint [1-1] (gc) [Entry date 09/16/92]
342	9/14/92	MINUTE ORDER: by Magistrate Judge Donald E. Abram; Status Conference held 9/11/92 (cc: all counsel); entry date: 9/16/92 (gc) [Entry date 09/16/92]
343	9/16/92	Supplemental STATEMENT by defendant Amoco Production Co in support of interim relief for ongoing operations (gc)
344	9/18/92	MOTION by defendant Tiffany Gas Company for extension of time to submit title cost data to 10/16/92 (gc) [Entry date 09/21/92]
345	9/18/92	Fourth Joint STATUS REPORT by plaintiff Southern Ute Indian, defendant Amoco Production Co regarding jurisdiction (gc) [Entry date 09/21/92]

Sub #	Date	Description
346	9/22/92	ORDER by Magistrate Judge Donald E. Abram granting Tiffany Gas' motion for extension of time to submit title cost data to 10/16/92 [344-1] (cc: all counsel); entry date: 9/24/92 (gc) [Entry date 09/24/92]
347	9/23/92	MOTION by Dennis Bicknell, Director Colo Oil/Gas Conservation Comm to quash subpoena duces tecum, and for protective order prohibiting Pltf from examining Dennis Bicknell re: information in returns (gc) [Entry date 09/24/92]
348	9/23/92	ATTORNEY APPEARANCE for Colo Oil/Gas Conservation Comm by Timothy J. Monahan, Attorney General's Office (gc) [Entry date 09/24/92]
349	9/24/92	MOTION by plaintiff Southern Ute Indian to strike Amoco's supplemental statement in support of interim relief for ongoing operations, or in the alternative for leave to file attached tribal response to Amoco's supplemental statement in support of interim relief for ongoing operations (gc)
—	9/24/92	Tendered Response to Amoco's Supplemental Statement in Support of Interim Relief for Ongoing Operations submitted by plaintiff Southern Ute Indian re motion for leave to file attached tribal response to Amoco's supplemental statement in support of interim relief for ongoing operations [349-2] (gc)
350	9/24/92	MOTION by defendant Amoco Production Co to quash subpoena issued to Dennis Bicknell, Director of Oil and Gas Conservation Commission, and for protective order that the documents described in such subpoena not be produced and joinder in motion filed by State of Colorado to quash and for protective order re: this subpoena (gc) [Entry date 09/25/92]

Sub #	Date	Description
351	9/25/92	Fifth Joint STATUS REPORT Regarding Jurisdiction by plaintiff Southern Ute Indian, defendant Amoco Production Co (gc)
352	10/1/92	MINUTE ORDER: by Magistrate Judge Donald E. Abram setting hearing on motion to quash subpoena duces tecum [347-1], motion for protective order prohibiting Pltf from examining Dennis Bicknell re: information in returns [347-2], motion to quash subpoena issued to Dennis Bicknell, Director of Oil and Gas Conservation Commission [350-1], motion for protective order that the documents described in such subpoena not be produced [350-2], motion to strike Amoco's supplemental statement in support of interim relief for ongoing operations [349-1], motion for leave to file attached tribal response to Amoco's supplemental statement in support of interim relief for ongoing operations [349-2] all at 1:00 10/16/92 (cc: all counsel); entry date: 10/1/92 (gc)
353	10/2/92	Sixth Joint STATUS REPORT by plaintiff, defendant Amoco (gc)
354	10/2/92	Joint MOTION by Pltf Southern Ute Indian and Deft Markwest Energy Prt to approve settlement agreement, and to dismiss claims against Markwest (This document and its attachments were submitted under seal—but was unsealed per court order of 10/28/92. Document as removed from the vault and placed in the file) (gc) [Edit date 10/30/92]

Sub #	Date	Description
355	10/2/92	Letter (STATEMENT) by Barry Spector, counsel for defendant Markwest Energy Prt re motion to approve settlement agreement [354-1] and motion to dismiss claims against Markwest [354-2] . . . requesting that a copy of the motion be placed in the file as it is not confidential, but originnl motion and attachments are confidential and are submitted in a sealed envelope. (gc)
356	10/2/92	TRANSCRIPT of Hearing on Motions Re: Interim Relief and Severance Tax on 8/21/92 before Judge Babcock. Pages 1-64 (Cert. Copy) (gc) [Entry date 10/05/92]
357	10/5/92	ORDER by Judge Lewis T. Babcock granting motion to withdraw attorneys James P. Rouse and Steven F. Mueller of Burns, Wall, Smith and Mueller [339-1] attorney James Parker Rouse Sr. for Richmond Petroleum (cc: all counsel); entry date: 10/5/92 (gc)
358	10/5/92	MOTION by plaintiff Southern Ute Indian to compel Dennis Bicknell to produce documents in accordance with subpoena duces tecum (gc) [Entry date 10/06/92]
359	10/5/92	RESPONSE by plaintiff Southern Ute Indian to Dennis Bicknell, Dir. Colorado Oil and Gas Consv. Comm's motion to quash subpoena duces tecum [347-1] and motion for protective order prohibiting Pltf from examining Dennis Bicknell re: information in returns [347-2] and Amoco's motion to quash subpoena issued to Dennis Bicknell, Director of Oil and Gas Conservation Commission [350-1] and motion for protective order that the documents described in such subpoena not be produced [350-2] (gc) [Entry date 10/06/92]

Sub #	Date	Description
359	10/5/92	Memorandum BRIEF by plaintiff Southern Ute Indian in support of motion to compel Dennis Bicknell to produce documents in accordance with subpoena duces tecum [358-1] (gc) [Entry date 10/06/92]
360	10/6/92	Joint Motion by plaintiff Southern Ute Indian, defendant McKenzie Methane to dismiss before Judge Lewis T. Babcock (Filed under seal—Court ordered this document unsealed in Order of 10/28/92—document placed in the file) (gc) [Entry date 10/07/92] [Edit date 11/02/92]
361	10/8/92	MINUTE ORDER: by Magistrate Judge Donald E. Abram. Response to motion to compel filed by pltf 10/5/92 [358-1] shall be filed by 10/15/92 (cc: all counsel); entry date: 10/9/92 (gc) [Entry date 10/09/92]
362	10/8/92	ORDER by Judge Lewis T. Babcock denying motion of Pltf and Deft MarkWest to approve settlement agreement [354-1] and denying motion of Pltf. and Deft MarkWest to dismiss claims against Markwest [354-2] without prejudice and with leave granted to submit an amended motion deleting the condition of confidentiality, or in the alternative, setting forth with specificity the reason justifying such a condition, the motion to be submitted within 20 days. (cc: all counsel); entry date: 10/9/92 (gc) [Entry date 10/09/92] [Edit date 10/09/92]
363	10/8/92	ORDER by Judge Lewis T. Babcock denying Pltf's and Deft McKenzie's motion to dismiss before Judge Lewis T. Babcock [360-1] without prejudice and with leave granted to submit an amended motion delet-

Sub #	Date	Description
		ing the condition of confidentiality, or in the alternative, setting forth with specificity the reasons justifying such a condition, the motion to be submitted within 20 days. (cc: all counsel); entry date: 10/9/92 (gc) [Entry date 10/09/92]
364	10/8/92	CERTIFICATE by plaintiff Southern Ute Indian of mailing of Joint Motion of Pltf. and Deft MarkWest to Approve Settlement Agreement and to Dismiss Claims against MarkWest and proposed order and of Joint Motion of Pltf. and Deft Mckenzie to Approve Settlement Agreement and to Dismiss Claims against McKenzie and proposed Order on 10/7/92 (gc) [Entry date 10/09/92]
365	10/9/92	Seventh Joint STATUS REPORT Regarding Jurisdiction by plaintiff Southern Ute Indian, defendant Amoco Production Co (gc)
366	10/14/92	RESPONSE by defendant Amoco Production Co to motion to compel Dennis Bicknell to produce documents in accordance with subpoena duces tecum [358-1] (gc) [Entry date 10/15/92]
367	10/14/92	MOTION by Colo Oil/Gas Comm to vacate hearing on 10/16/92, and to extend time to respond to motion to compel to 10/23/92 (gc) [Entry date 10/20/92]
368	10/14/92	Unopposed MOTION by defendant Amoco Production Co for order that district court accept jurisdiction over pending matters unrelated to the Tribe's appeal (gc) [Entry date 10/20/92]
369	10/15/92	RESPONSE by defendant Amoco Production Co to Colo Oil and Gas Consrv.

Sub #	Date	Description
		Comm's motion to vacate hearing on 10/16/92 [367-1] and to extend time to respond to motion to compel to 10/23/92 [367-2] (gc) [Entry date 10/20/92]
370	10/15/92	ORDER by Judge Lewis T. Babcock granting Amoco's unopposed motion for order that district court accept jurisdiction over pending matters unrelated to the Tribe's appeal [368-1] (cc: all counsel); entry date: 10/20/92 (gc) [Entry date 10/20/92]
371	10/15/92	ORDER by Judge Lewis T. Babcock re [325-2]. Interim relief is granted as to ongoing coalbed methane gas operations and denied as to Tribe's severance tax (See order for detail) (cc: all counsel); entry date: 10/20/92 (gc) [Entry date 10/20/92]
372	10/16/92	COURTROOM MINUTES by Magistrate Judge Donald E. Abram; Mag Conf held 10/16/92 denying motion to vacate hearing on 10/16/92 [367-1] granting Bicknell's motion to extend time to respond to motion to compel to 10/23/92 [367-2]. Motion to compel Dennis Bicknell to produce documents in accordance with subpoena duces tecum [358-1] is submitted, that the motion to quash subpoena issued to Dennis Bicknell, Director of Oil and Gas Conservation Commission [350-1] is submitted, that the motion for protective order that the documents described in such subpoena not be produced [350-2] is submitted, that the motion to quash subpoena duces tecum [347-1] is submitted, that the motion for protective order prohibiting Pltf from examining Dennis Bicknell re: information

Sub #	Date	Description
		in returns [347-2] is submitted. These motions are held in abeyance with written order to issue. Denying motion to strike Amoco's supplemental statement in support of interim relief for ongoing operations [349-1]. Parties to submit a joint order for extending deadlines on the expert witnesses to the Mag. Judge for signature. entry date 10/20/92 (gc) [Entry date 10/20/92]
373	10/16/92	TRANSCRIPT of Hearing on Motions re: Interim Relief and Severance Tax on 8/21/92 before Judge Babcock. Pages 1-64 (Cert. Copy) (gc) [Entry date 10/20/92]
374	10/16/92	TRANSCRIPT of Status Conference on 6/19/92 before Judge Babcock. Pages 1-16 (Cert. Copy) (gc) [Entry date 10/20/92]
375	10/23/92	RESPONSE by Mr. Bicknell for Colo Oil/Gas Comm to motion to compel Dennis Bicknell to produce documents in accordance with subpoena duces tecum [358-1] (gc) [Entry date 10/28/92]
376	10/27/92	Amended Joint Motion by plaintiff Southern Ute Indian, defendant Markwest Energy Prt to approve settlement agreement and to dismiss claims against Markwest before Judge Lewis T. Babcock (gc) [Entry date 10/28/92]
377	10/28/92	ORDER by Judge Lewis T. Babcock granting amended joint motion to approve settlement agreement and to dismiss claims against Markwest before Judge Lewis T. Babcock [376-1]. Settlement agreement between Pltf and MarkWest Energy Partners dated 5/19/92 is approved and incorporated as part of this order. All claims of pltf. against Markwest Energy are dismissed

Sub #	Date	Description
		with prejudice. The attachments to the original joint motion of pltf and deft Markwest to approve settlement agreement and to dismiss claims against MarkWest [354-1], [354-2] are unsealed and said documents shall be placed in the public court file. Pltf and Deft MarkWest to make diligent efforts to notify those persons or entities eligible to ratify the settlement agreement, etc. Each party to bear its own costs. terminating party Markwest Energy Prt (cc: all counsel); entry date: 10/30/92 (gc) [Entry date 10/30/92]
379	10/28/92	ORDER by Judge Lewis T. Babcock granting amended joint motion to approve settlement agreement and to dismiss claims against McKenzie before Judge Lewis T. Babcock [378-1]. Settlement agreement entered between Pltf. and Deft McKenzie is approved and incorporated as a part of this order. All claims of pltf. against Markwest (sic) are dismissed with prejudice terminating party McKenzie Methane. Attachments to original joint motion of pltf. and deft McKenzie to approve settlement agreement and to dismiss claims against McKenzie [360-1] are unsealed and said documents shall be placed in the public court file. Pltf. and Deft McKenzie to make diligent efforts to notify those persons or entities eligible to ratify the settlement agreement of the pendency of this aaction, of the cert. of deft. class and of the option of ratification of settlement agreement. Each party to bear its own costs (cc: all counsel); entry date: 11/2/92 (gc) [Entry date 11/02/92]
378	10/29/92	Amended Joint Motion by plaintiff Southern Ute Indian, defendant McKenzie Me-

Sub #	Date	Description
		thane to approve settlement agreement and to dismiss claims against McKenzie before Judge Lewis T. Babcock (gc) [Entry date 11/02/92]
380	10/29/92	Joint MOTION by plaintiff Southern Ute Indian, defendant Amoco Production Co to modify order re: joint stipulated plan and schedule for discovery (gc) [Entry date 11/02/92]
381	11/2/92	AMENDED ORDER by Judge Lewis T. Babcock re [379-2] re [378-1] Settlement agreement between pltf. and McKenzie Methane Corp is approved and incorporated as part of this order. All claims of pltf. against McKenzie Methane Corp. are dismissed with prejudice. Attachments to original joint motion of pltf. and deft McKenzie to approve settlement agreement and to dismiss claims against McKenzie are unsealed and said documents shall be place in the public court file. Pltf. and deft to make efforts to notify persons or entities eligible to ratify settlement agreement, etc. Each party to bear its own costs. (cc: all counsel); entry date: 11/5/92 (gc) [Entry date 11/05/92]
382	11/9/92	Joint MOTION by plaintiff Southern Ute Indian, defendant Amoco Production Co for entry of protective order for discovery (gc) [Entry date 11/10/92]
383	11/10/92	PROTECTIVE ORDER by Magistrate Judge Donald E. Abram: granting motion for entry of protective order for discovery [382-1]. Documents may be designated as "Confidential" or "Highly Confidential". Access to these documents is restricted (see order for detail). None of these pleadings shall be filed with the court except under

Sub #	Date	Description
		seal and shall have a legend to this effect prominently displayed. (cc: all counsel) (gc) [Entry date 11/12/92]
384	11/12/92	MOTION by defendant Palo Petroleum, Inc. for clarification and ruling on payment of Tribal severance taxes as ordered on 10/15/92 (gc) [Entry date 11/13/92]
385	11/13/92	ORDER by Judge Lewis T. Babcock granting Deft Palo Petroleum's motion for clarification and ruling on payment of Tribal severance taxes as ordered on 10/15/92 [384-1] (cc: all counsel); entry date: 11/19/92 (gc) [Entry date 11/19/92]
386	11/20/92	NOTICE by defendant JM Huber Corporation of attorney change of address of Thomas P. Dugan and Lon W. Abadie (gc)
387	11/20/92	Joint MOTION by plaintiff Southern Ute Indian, defendant Amoco Production Co for extension of time to submit letters stating settlement positions to 12/4/92 (gc) [Entry date 11/23/92]
388	11/20/92	Unopposed MOTION by defendant Amoco Production Co for extension of time for defts to respond to discovery to 30 days from time each such deft would be otherwise required to respond (gc) [Entry date 11/23/92]
389	11/25/92	AMENDMENT to unopposed motion for extension of time for defts to respond to discovery to 30 days from time each such deft would be otherwise required to respond [388-1] by Amoco Production Co (gc) [Entry date 11/27/92]
390	12/4/92	Reentry of ATTORNEY APPEARANCE for defendant Richmond Petroleum by James P. Rouse (gc) [Entry date 12/07/92]

Sub #	Date	Description
391	12/8/92	NOTICE by defendant Amoco Production Co of continuance of deposition of CLARENCE L. HARR to 12/11/92 at 1:00 pm (gc) [Entry date 12/09/92]
392	12/10/92	MEMORANDUM by Magistrate Judge Donald E. Abram; settlement conf held at 1:00 12/9/92 (gc) [Entry date 12/11/92]
393	12/17/92	Expedited Joint Motion by plaintiff Southern Ute Indian and unnamed deft SG Interests II, Ltd to approve settlement agreement and to dismiss claims against SG Interests II, Ltd before Judge Lewis T. Babcock (gc) [Entry date 12/18/92]
395	12/18/92	ORDER by Judge Lewis T. Babcock granting expedited joint motion to approve settlement agreement and to dismiss claims against SG Interests II, Ltd before Judge Lewis T. Babcock [393-1] Settlement agreement between Pltf. and SG Interests II, Ltd is approved and incorporated as part of this order. Pltf takes nothing and all claims of pltf against SG Interests are dismissed with prejudice. Pltf. and Deft to make diligent efforts to notify persons or entitities eleible to ratify settlement agreement. Each party to bear its own costs. (cc: all counsel); entry date: 12/21/92 (gc) [Entry date 12/21/92]
394	12/21/92	NOTICE by plaintiff Southern Ute Indian of withdrawal of attorney John S. Pfeiffer (gc)
396	12/23/92	NOTICE by defendant Amoco Production Co of taking deposition of COUNCIL OF ENERGY RESOURCE TRIBE on 1/4/93 at 9:30 am (gc)

Sub #	Date	Description
399	12/28/92	ORDER by Magistrate Judge Donald E. Abram granting motion for extension of time for defts to respond to discovery to 30 days from time each such deft would be otherwise required to respond [388-1]; Amoco has to 12/23/92 to respond to plf 2nd interrogs, req for prod and req for admissions and def oil companies that were served w/plf 1st interrogs, req for prod and req for admission have to 12/30/92 to respond to such discovery (cc: all counsel); entry date: 12/30/92 (yk) [Entry date 12/30/92]
400	12/28/92	ORDER by Magistrate Judge Donald E. Abram granting motion to modify order re: joint stipulated plan and schedule for discovery [380-1] as to expert witness information only (cc: all counsel); entry date: 12/30/92 (yk) [Entry date 12/30/92]
401	12/18/92	MINUTE ORDER: by Magistrate Judge Donald E. Abram granting motion for extension of time to submit letters stating settlement positions to 12/4/92 [387-1]; mtn for extension to respond to discovery filed 11/20/92 filed by Amoco denied as moot, court having granted amended unopposed mtn for extension to respond; mag status conference set at 4:30 1/27/93; status conf set at 4:30 2/23/93; status conf. set at 4:30 3/24/93 (cc: all counsel); entry date: 12/30/92 (yk) [Entry date 12/30/92]
397	12/29/92	MOTION by defendant Richmond Petroleum to extend time to respond to plf 1st itnerrogs, req for prod and req for admissions (yk) [Entry date 12/30/92]
398	12/29/92	Certificate of Compliance by defendant Richmond Petroleum re: motion to extend

Sub #	Date	Description
		time to respond to plf 1st interrogs, req for prod and req for admissions [397-1] (yk) [Entry date 12/30/92]
402	12/30/92	ORDER by Magistrate Judge Donald E. Abram granting motion to extend time to respond to plf 1st itnerrogs, req for prod and req for admissions [397-1] to 1/29/93 (cc: all counsel); entry date: 12/30/92 (yk)
403	12/31/92	Designation of Rebutal Trial Expert Witness for defendant Conoco, Inc. (yk)
404	12/31/92	Designation of Rebuttal Trial Expert Witness for defendant Palo Petroleum, Inc. (yk)
405	1/11/93	MOTION by plaintiff Southern Ute Indian to compel Amoco Production Co. re attorney client privilege and work product immunity (gc) [Entry date 01/12/93]
407	1/14/93	Joint MOTION by plaintiff Southern Ute Indian, defendant Amoco Production Co to modify order: joint stipulated plan and schedule for discovery to allow additional expert witness designation (gc) [Entry date 01/15/93]
406	1/15/93	Designation of Oppositon Expert Witness for defendant Richmond Petroleum (yk)
408	1/15/93	Expert Witness designation for class action claim for defendant Amoco Production Co (gc)
409	1/15/93	Unopposed MOTION by defendant Amoco Production Co for leave to file response to pltf's motion to compel re: attorney-client privilege and work product immunity (gc) [Entry date 01/20/93]
410	1/15/93	Identification of experts for defendant Fuel Resources Dev (gc) [Entry date 01/20/93]

Sub #	Date	Description
411	1/15/93	Identification of Experts for defendant Natl Coop Refinery (gc) [Entry date 01/20/93]
412	1/15/93	MINUTE ORDER: by Magistrate Judge Donald E. Abram granting Amoco's motion for leave to file response to pltf's motion to compel re: attorney-client privilege and work product immunity [409-1] to 1/26/93 re [405-1] (cc: all counsel); entry date: 1/20/93 (gc) [Entry date 01/20/93]
413	1/20/93	MOTION by defendant Conoco, Inc. to withdraw attorney Thomas Burton (yk) [Entry date 01/21/93]
414	1/20/93	MOTION by defendant Conoco, Inc. for attorney Russell Dwight Howell to appear pro hac vice (yk) [Entry date 01/21/93]
415	1/20/93	CERTIFICATEof mailing of mtn to w/d, notice and mtn phv by defendant Conoco, Inc. (yk) [Entry date 01/21/93]
416	1/21/93	MINUTE ORDER: by Judge Lewis T. Babcock granting motion to withdraw attorney Thomas Burton [413-1]; withdrawing attorney Thomas Hosea Burton Jr. for Conoco, Inc. Granting motion for attorney Russell Dwight Howell to appear pro hac vice [414-1]. (cc: all counsel); entry date: 1/25/93 (sh) [Entry date 01/25/93]
417	1/28/93	NOTICE by defendant Amoco Production Co of taking deposition of Harry Marsh on 2/2/93. (sh)
418	1/29/93	Motion by plaintiff Southern Ute Indian, Deft SG Intersts I, and Deft BellSouth Corp Health Care Trust to approve settlement agreement and to dismiss claims against SG Interests I, Ltd. and Bellsouth Corp Health Care Trust before Judge Lewis T. Babcock. (sh) [Edit date 02/09/93]

Sub #	Date	Description
419	1/29/93	Cross-MOTION by defendant Amoco Production Co to compel re: attorney-client privilege (gc) [Entry date 02/01/93]
420	1/29/93	RESPONSE by defendant Amoco Production Co to Pltf's motion to compel Amoco Production Co. re attorney client privilege and work product immunity [405-1] (gc) [Entry date 02/01/93]
420	1/29/93	Memorandum BRIEF by defendant Amoco Production Co in support of Cross-motion to compel re: attorney-client privilege [419-1] (gc) [Entry date 02/01/93]
421	2/2/93	MOTION by Landowner Coalseam Commttee to reform and clarify the court's order approving the settlements between the Southern Ute Indian Tribe and Markwest Energy, McKenzie Methan, SG Interests II, SG Interests I and Bellsouth Corp. (gc)
422	2/2/93	MOTION by Landowner Coalseam Comm to file brief re: reformation and clarification of court's orders approving the settlements in excess of 10 pages (gc)
423	2/2/93	BRIEF by Landowner Coalseam Comm in support of motion to reform and clarify the court's order approving the settlements between the Southern Ute Indian Tribe and Markwest Energy, McKenzie Methan, SG Interests II, SG Interests I and Bellsouth Corp. [421-1] (gc)
424	2/2/93	MOTION by Landowner Coalseam Comm for order for Pltf to give prompt notice to unnamed defendants, and to designate an additional class representative and amend case management order No. 1 to name Landowner Coalseam Committee as class

Sub #	Date	Description
		representative for the subclass of mineral and overriding royaalty owner defts (gc) [Edit date 02/02/93]
425	2/2/93	MOTION by Landowner Coalseam Comm to file brief re: prompt notice to unnamed defts, to designate an additional class representative and to amend case management order no. 1 in excess of 10 pages (gc)
426	2/2/93	BRIEF by Landowner Coalseam Comm in support of motion for order for Pltf to give prompt notice to unnamed defendants [424-1], designate an additional class representative and to amend case management order No. 1 [424-2] (gc)
427	2/2/93	Joint MOTION by plaintiff Southern Ute Indian, defendant Amoco Production Co and lead counsel for Defts' Steering Committee for order limiting production of documents related to expert witnesses (gc)
428	2/5/93	MOTION by Landowner Coal Comm for accounting, show cause order and assurances from Palo Petroleum, Inc. re: suspended royalty payments (gc) [Entry date 02/08/93]
429	2/8/93	MOTION by Federal defendants for enlargment of time to respond to pltf's discovery to 3/26/93 (gc)
430	2/8/93	MINUTE ORDER: by Judge Lewis T. Babcock granting Landowners Coalseam Committee's motion to file brief re: prompt notice to unnamed defts, to designate an additional class representative and to amend case management order no. 1 in excess of 10 pages [425-1] and granting Landowners Coalseam Committee's motion to file brief re: reformation and clarification

Sub #	Date	Description
		of court's orders approving the settlements in excess of 10 pages [422-1]. Responses to these motions are due 3/1/93 and Landowners have 10 days to reply [424-1] [424-2] [421-1]. The joint motion of Pltf. and Deft SG Interest, etc. to dismiss claims between these parties before Judge Lewis T. Babcock. [418-1] is stayed (is submitted) pending resolution of the motion to reform and clarify the court's order approving the settlement between Pltf. and Markwest Energy, et al (cc: all counsel); entry date: 2/9/93 (gc) [Entry date 02/09/93]
431	2/12/93	NOTICE by defendant Mobil Oil Corp, defendant North Central Oil of attorney change of address and firm affiliation (gc) [Entry date 02/16/23]
432	2/12/93	MOTION by plaintiff Southern Ute Indian for leave to file response to Amoco's cross motion to compel regarding attorney/client privilege and pltf's reply in support of its motion to compel in excess of 10 pages (gc) [Entry date 02/17/93]
433	2/12/93	RESPONSE by plaintiff Southern Ute Indian to Amoco's cross-motion to compel re: attorney-client privilege [419-1] (gc) [Entry date 02/17/93]
433	2/12/93	REPLY by plaintiff Southern Ute Indian to response to motion to compel Amoco Production Co. re attorney client privilege and work product immunity [405-1] (gc) [Entry date 02/17/93]
438	2/14/93	ORDER by Magistrate Judge Donald E. Abram granting joint motion for order limiting production of documents related to expert witnesses [427-1] (cc: all counsel); entry date: 2/22/93 (gc) [Entry date 02/22/93]
434	2/16/93	BRIEF by Landowner Coalseam Comm in support of Amoco's motion to compel re: attorney-client privilege [419-1] (gc) [Entry date 02/17/93]
435	2/16/93	MOTION by Landowner Coalseam Comm for order for acceptance of designation of expert witnesses (gc) [Entry date 02/17/93]
436	2/16/93	Designation of Expert Witness for Landowner Coal Comm (gc) [Entry date 02/17/93]
437	2/16/93	NOTICE by defendant Amoco Production Co of taking deposition of JEFFREY R. LEVINE on 3/1/93 at 9:30 am (gc) [Entry date 02/17/93]
439	2/16/93	ORDER by Magistrate Judge Donald E. Abram granting Amoco's motion for leave to file response to pltf's motion to compel re: attorney-client privilege and work product immunity [409-1] Tribe's reply brief and response to Amoco's cross motion to compel due 2/12/93 . . . Amoco's reply brief due 2/22/93 re [405-1], re [419-1] (cc: all counsel); entry date: 2/22/93 (gc) [Entry date 02/22/93]
440	2/16/93	ORDER by Magistrate Judge Donald E. Abram granting joint motion to modify order: joint stipulated plan and schedule for discovery to allow additional expert witness designation [407-1] re [229-1] (cc: all counsel); entry date: 2/22/93 (gc) [Entry date 02/22/93]
441	2/19/93	ORDER by Magistrate Judge Donald E. Abram granting Federal Defts' motion for

Sub #	Date	Description
		enlargment of time to respond to pltf's discovery to 3/26/93 [429-1] (cc: all counsel); entry date: 2/22/93 (gc) [Entry date 02/22/93]
442	2/19/93	MINUTE ORDER: by Judge Lewis T. Babcock granting motion for leave to file response to Amoco's cross motion to compel regarding attorney/client privilege and pltf's reply in support of its motion to compel in excess of 10 pages [432-1] . . . denying as moot motion to vacate hearing on 10/16/92 [367-1] and to extend time to respond to motion to compel to 10/23/92 [367-2]. In the future when discovery motions are filed, opposing party is given 11 days to file a response. (cc: all counsel); entry date: 2/22/93 (gc) [Entry date 02/22/93]
443	2/22/93	REPLY by defendant Amoco Production Co to pltif's response to cross-motion to compel re: attorney-client privilege [419-1] (gc) [Entry date 02/23/93]
443	2/22/93	RESPONSE by defendant Amoco Production Co to pltf's reply in support of its motion to compel Amoco Production Co. re attorney client privilege and work product immunity [405-1] (gc) [Entry date 02/23/93]
444	2/23/93	COURTROOM MINUTES by Magistrate Judge Donald E. Abram taking under advisement on 2/23/93 the motion to compel Amoco Production Co. re attorney client privilege and work product immunity [405-1], taking under advisement on 2/23/93 the motion to compel re: attorney-client privilege [419-1]; entry date: 2/24/93 (gc) [Entry date 02/24/93]

Sub #	Date	Description
445	2/25/93	Objection (RESPONSE) by defendant Palo Petroleum, Inc. to Landowners Coalseam Committee's motion for accounting, show cause order and assurances from Palo Petroleum, Inc. re: suspended royalty payments [428-1] (gc) [Entry date 02/26/93]
446	2/26/93	Objection (RESPONSE) by plaintiff Southern Ute Indian to Landowner Coalseam Committee's motion for order for acceptance of designation of expert witnesses [435-1] (gc) [Entry date 03/01/93]
447	2/26/93	NOTICE by defendant Anthony F. Zarlengo of his change of address (gc) [Entry date 03/01/93]
448	3/1/93	MOTION by plaintiff Southern Ute Indian for leave to file Tribe's brief in response to LOCC's brief in support of motion to give prompt notice to unnamed defendants, to desginate an additional class representative and to amend case management order No. 1 in excess of 10 pages (gc)
449	3/1/93	BRIEF by plaintiff Southern Ute Indian in opposition to LOCC's motion for order for Pltf to give prompt notice to unnamed defendants [424-1], motion to designate an additional class representative and amend case management order No. 1 to name Landowner Coalseam Committee as class representative for the subclass of mineral and overriding royaalty owner defts [424-2] (gc)
450	3/1/93	RESPONSE by plaintiff Southern Ute Indian to LOCC's motion to reform and clarify the court's order approving the settlements between the Southern Ute Indian

Sub #	Date	Description
		Tribe and Markwest Energy, McKenzie Methan, SG Interests II, SG interests I and Bellsouth Corp. [421-1] (gc)
451	3/1/93	RESPONSE by plaintiff Southern Ute Indian to LOCC's motion for accounting, show cause order and assurances from Palo Petroleum, Inc. re: suspended royalty payments [428-1] (gc)
452	3/1/93	RESPONSE by plaintiff Southern Ute Indian to LOCC's motion for order for Pltf to give prompt notice to unnamed defendants [424-1], motion to designate an additional class representative and amend case management order No. 1 to name Landowner Coalseam Committee as class representative for the subclass of mineral and overriding royaalty owner defts [424-2] (gc)
453	3/1/93	MOTION by SG Interests I, SG Interests II for attorney Claudia W. Frost to appear pro hac vice as co-counsel (gc)
454	3/1/93	Special ATTORNEY APPEARANCE for defendant Markwest Energy by Barry Spectors to respond to motion of LOCC to reform and clarify the court's orders approving the settlements between the Southern Ute Indian Tribe and Markwest Energy Partners, Ltd., et al (gc)
455	3/1/93	SUPPLEMENT by defendant Markwest Energy Prt attorney to special entry of appearance regarding motion of LOCC to reform and clarify the court's orders approving the settlements between the Southern Ute Indian Tribe and Markwest, et al [454-1] (gc)

Sub #	Date	Description
456	3/1/93	RESPONSE by SG Interests I, Ltd, SG Interests II, Ltd to LOCC's motion to reform and clarify the court's order approving the settlements between the Southern Ute Indian Tribe and Markwest Energy, McKenzie Methan, SG Interests II, SG Interests I and Bellsouth Corp. [421-1] and brief in support (gc)
457	3/1/93	MINUTE ORDER: by Magistrate Judge Donald E. Abram. Parties to submit privilege log to opposing counsel and court by 3/10/93 on cross motions to compel re [405-1], re [419-1] (cc: all counsel); entry date: 3/1/93 (gc)
458	3/1/93	ORDER by Magistrate Judge Donald E. Abram granting Director of the Oil and Gas Cons. Comm's to quash subpoena duces tecum [347-1] and for protective order prohibiting Pltf from examining Dennis Bicknell re: information in returns [347-2] granting Amoco's motion to quash subpoena issued to Dennis Bicknell, Director of Oil and Gas Conservation Commission [350-1] and for protective order that the documents described in such subpoena not be produced [350-2] denying pltf's motion to compel Dennis Bicknell to produce documents in accordance with subpoena duces tecum [358-1] cc: all counsel); entry date: 3/1/93 (gc)
459	3/1/93	RESPONSE by defendant Conoco, Inc. to LOCC's motion for order for Pltf to give prompt notice to unnamed defendants [424-1], motion to designate an additional class representative and amend case management order No. 1 to name Landowner Coalseam Committee as class representative for the

Sub #	Date	Description
		subclass of mineral and overriding royaalty owner defts [424-2] (gc) [Entry date 03/02/93]
460	3/1/93	RESPONSE by defendant Conoco, Inc. to LOCC's motion to reform and clarify the court's order approving the settlements between the Southern Ute Indian Tribe and Markwest Energy, McKenzie Methan, SG Interests II, SG Interests I and Bellsouth Corp. [421-1) (gc) [Entry date 03/02/93]
461	3/1/93	RESPONSE by defendant Palo Petroleum, Inc. to LOCC's motion to reform and clarify the court's order approving the settlements between the Southern Ute Indian Tribe and Markwest Energy, McKenzie Methan, SG Interests II, SG Interests I and Bellsouth Corp. [421-1] (gc) [Entry date 03/02/93]
462	3/1/93	RESPONSE by defendant Palo Petroleum, Inc. to LOCC's motion for order for Pltf to give prompt notice to unnamed defendants [424-1], motion to designate an additional class representative and amend case management order No. 1 to name Landowner Coalseam Committee as class representative for the subclass of mineral and overriding royaalty owner defts [424-2] (gc) [Entry date 03/02/93]
463	3/1/93	RESPONSE by defendant Amax Oil & Gas, Inc. to LOCC's motion to reform and clarify the court's order approving the settlements between the Southern Ute Indian Tribe and Markwest Energy, McKenzie Methan, SG Interests II, SG Interests I and Bellsouth Corp. [421-1] (gc) [Entry date 03/02/93]
464	3/1/93	RESPONSE by defts Meridian Oil, Inc., Amax Oil & Gas, Inc., Pablo Operating Co

Sub #	Date	Description
		to LOCC's motion for order for Pltf to give prompt notice to unnamed defendants [424-1], motion to designate an additional class representative and amend case management order No. 1 to name Landowner Coalseam Committee as class representative for the subclass of mineral and overriding royaalty owner defts [424-2] (gc) [Entry date 03/02/93]
465	3/1/93	RESPONSE by defendant Fuel Resources Dev to LOCC's motion for order for Pltf to give prompt notice to unnamed defendants [424-1], motion to designate an additional class representative and amend case management order No. 1 to name Landowner Coalseam Committee as class representative for the subclass of mineral and overriding royaalty owner defts [424-2] (gc) [Entry date 03/02/93]
466	3/1/93	RESPONSE by defendant Amoco Production Co to LOCC's motion for order for Pltf to give prompt notice to unnamed defendants [424-1], motion to designate an additional class representative and amend case management order No. 1 to name Landowner Coalseam Committee as class representative for the subclass of mineral and overriding royaalty owner defts [424-2] (gc) [Entry date 03/02/93]
467	3/1/93	RESPONSE by defendant Amoco Production Co to LOCC's motion to reform and clarify the court's order approving the settlements between the Southern Ute Indian Tribe and Markwest Energy, McKenzie Methan, SG Interests II, SG Interests I and Bellsouth Corp. [421-1] (gc) [Entry date 03/02/93]

Sub #	Date	Description
468	3/1/93	RESPONSE by defendant McKenzie Methane to LOCC's motion to reform and clarify the court's order approving the settlements between the Southern Ute Indian Tribe and Markwest Energy, McKenzie Methan, SG Interests II, SG Interests I and Bellsouth Corp. [421-1] (gc) [Entry date 03/02/93]
469	3/1/93	MINUTE ORDER: by Judge Lewis T. Babcock granting motion for attorney Claudia W. Frost to appear pro hac vice as co-counsel [453-1] (cc: all counsel); entry date: 3/2/93 (gc) [Entry date 03/02/93]
470	3/1/93	MINUTE ORDER: by Judge Lewis T. Babcock granting pltf's motion for leave to file Tribe's brief in response to LOCC's brief in support of motion to give prompt notice to unnamed defendants, to desginate an additional class representative and to amend case management order No. 1 in excess of 10 pages [448-1] (cc: all counsel); entry date: 3/2/93 (gc) [Entry date 03/02/93]
471	3/4/93	RESPONSE by defendant Amoco Production Co to 3/1/93 minute order [457-1] re privilege log (gc) [Entry date 03/05/93]
472	3/5/93	Plf submission of privilege log and RESPONSE by plaintiff Southern Ute Indian to minute order [457-1] (yk) [Entry date 03/08/93]
473	3/5/93	ATTORNEY APPEARANCE for SG Interests I, Ltd, SG Interests II, Ltd by Robert D. Poulson and Alan B. Cameron as co-counsel (gc) [Entry date 03/10/93]
474	3/8/93	MOTION by SG Interests I, Ltd, SG Interests II, Ltd for attorney Mark J. Thurber to appear pro hac vice (gc) [Entry date 03/10/93]

Sub #	Date	Description
475	3/10/93	MINUTE ORDER: by Judge Lewis T. Babcock granting motion for attorney Mark J. Thurber to appear pro hac vice [474-1] (cc: all counsel); entry date: 3/11/93 (gc) [Entry date 03/11/93]
476	3/10/93	ORDER by Magistrate Judge Donald E. Abram. Privilege log submitted pursuant to minute order of 3/1/93 is inadequate. Pltf. to submit new privilege log by 3/19/93 (cc all counsel); entry date: 3/12/93 (gc) [Entry date 03/12/93]
477	3/11/93	REPLY Brief by Landowner Coal Comm to response to motion for order for Pltf to give prompt notice to unnamed defendants [424-1] and motion to designate an additional class representative and amend case management order No. 1 to name Landowner Coalseam Committee as class representative for the subclass of mineral and overriding royaalty owner defts [424-2] (gc) [Entry date 03/12/93]
478	3/11/93	MOTION by Landowner Coal Comm for leave to file reply brief in support of motion to reform and clarify the court's orders approving the settlement between Markwest, etc. and for leave to file reply brief in support of motion to give prompt notice to unnamed defts, to designate an additional class representative and to amend case management order No. 1 in excess of 10 pages (gc) [Entry date 03/12/93]
479	3/11/93	REPLY Brief by Landowner Coal Comm to response to motion to reform and clarify the court's order approving the settle-

Sub #	Date	Description
		ments between the Southern Ute Indian Tribe and Markwest Energy, McKenzie Methan, SG Interests II, SG Interests I and Bellsouth Corp. [421-1] (gc) [Entry date 03/12/93]
491	3/11/93	OBJECTIONS by plaintiff Southern Ute Indian to order of Chief Magistrate Judge Abram filed 3/1/93 [458-1] (gc) [Entry date 04/01/93]
480	3/15/93	Supplemental CERTIFICATE by plaintiff Southern Ute Indian of service of Tribe's Objection under Rule 72(a) FRCP to order of Chief Magistrate Judge Abram, filed 3/1/93 (gc)
481	3/15/93	MINUTE ORDER: by Judge Lewis T. Babcock granting Landowners Coalseam Committee's motion for leave to file reply brief in support of motion to reform and clarify the court's orders approving the settlement between Markwest, etc. and for leave to file reply brief in support of motion to give prompt notice to unnamed defts, to designate an additional class representative and to amend case management order No. 1 in excess of 10 pages [478-1] (cc: all counsel); entry date: 3/15/93 (gc)
482	3/15/93	NOTICE by Colo Oil/Gas Comm of substitution of counsel. Julie D. Wrend will now represent them. (gc) [Entry date 03/16/93]
483	3/16/93	MOTION by plaintiff Southern Ute Indian, defendant Union TX Petroleum to dismiss claims against Union Texas Petroleum Energy Corp. (gc) [Entry date 03/17/93]
484	3/16/93	ORDER by Judge Lewis T. Babcock granting motion to dismiss claims against Union

Sub #	Date	Description
		Texas Petroleum Energy Corp. [483-1]. Claims against Union Texas Petroleum Corp. and Union Texas Petroleum Energy Corporation, successor by merger to Union Texas Petroleum Corp. are dismissed without prejudice and each party to bear its own costs. terminating party Union TX Petroleum (cc: all counsel); entry date: 3/18/93 (gc) [Entry date 03/18/93]
485	3/19/93	NOTICE by defendant Amoco Production Co of taking deposition of JOHN B. GUSTAVSON on 4/6/93 at 8:30 am (gc)
488	3/19/93	Submission of Revised Privilege Log and RESPONSE by plaintiff Southern Ute Indian to order of 3/10/93 [476-1] (gc) [Entry date 03/25/93]
486	3/22/93	RESPONSE by defendant Amoco Production Co to Tribe's Objection Under Rule 72(a) FRCP to order of Chief Mag. Judge Agram filed 3/1/93 [458-1] (gc) [Entry date 03/23/93]
487	3/22/93	NOTICE by defendant Amoco Production Co of taking deposition of JAMES T. COOPER on 3/25/93 at 8:30 am (gc) [Entry date 03/23/93]
489	3/24/93	ORDER by Magistrate Judge Donald E. Abram granting pltf's motion to compel Amoco Production Co. re attorney client privilege and work product immunity [405-1] granting Amoco's motion to compel re: attorney-client privilege [419-1] (cc: all counsel); entry date: 3/25/93 (gc) [Entry date 03/25/93]
490	3/30/93	Joint MOTION by plaintiff Southern Ute Indian, defendant Richmond Petroleum for extension of time for tribe to respond to discovery from Richmond to 4/30/93 (gc) [Entry date 03/31/93]

Sub #	Date	Description
492	3/31/93	Joint MOTION by plaintiff Southern Ute Indian, defendant Fuel Resources Dev for extension of time for Tribe to respond to discovery from Fuel Resources to 5/3/93 (gc) [Entry date 04/02/93]
493	3/31/93	Joint Motion by plaintiff Southern Ute Indian, defendant Conoco, Inc. for dismissal of Conoco, Inc. before Judge Lewis T. Babcock (gc) [Entry date 04/02/93]
494	4/1/93	ORDER by Judge Lewis T. Babcock granting motion for dismissal of Conoco, Inc. before Judge Lewis T. Babcock [493-1] without costs to either party dismissing party Conoco, Inc. (cc: all counsel) entry date: 4/2/93 (gc) [Entry date 04/02/93]
495	4/1/93	Expedited Joint MOTION by plaintiff Southern Ute Indian, defendant Amoco Production Co for stay of Order of 3/24/93 by Chief Mag. Judge Abram, and to extend time for filing objections to Order of 3/24/93 (gc) [Entry date 04/02/93]
496	4/2/93	ORDER by Judge Lewis T. Babcock granting motion for stay of Order of 3/24/93 by Chief Mag. Judge Abram [495-1] granting motion to extend time for filing objections to Order of 3/24/93 [495-2]. Order of 3/24/93 granting cross-motions to compel re: attorney/client privilege is stayed until further order of court. [489-1]. Tribe and Amoco to file joint motion re: case management by 4/7/93. Period for filing objections under Rule 72(a) to Order of 3/24/93 is extended for a period of 10 days following entry of an order rejecting the joint motion on case management, should such an order enter by this court. (cc: all counsel); entry date: 4/5/93 (gc) [Entry date 04/05/93]

Sub #	Date	Description
497	4/5/93	ORDER by Magistrate Judge Donald E. Abram granting joint motion for extension of time for Tribe to respond to discovery from Fuel Resources to 5/3/93 [492-1] (cc: all counsel); entry date: 4/6/93 (gc) [Entry date 04/06/93]
498	4/7/93	MOTION (Joint) by plaintiff Southern Ute Indian and defendant Amoco Production Co for order to entry Case Mgmt Order No. 2 (pa) [Entry date 04/09/93]
499	4/8/93	MOTION by Landowner Coal Comm to amend proposed Case Mgmt Order No. 2 (pa) [Entry date 04/09/93]
500	4/8/93	MOTION by Landowner Coal Comm to exceed page limitation of brief in support of motion to amend proposed management order no. 2 (pa) [Entry date 04/09/93]
—	4/8/93	Tendered Brief in support of motion to submitted by plaintiff Southern Ute Indian motion to exceed page limitation of brief in support of motion to amend proposed management order no. 2 [500-1] (pa) [Entry date 04/09/93]
501	4/8/93	MOTION (Request) by SG Interests I, Ltd. and SG Interests II, Ltd to for hearing on motions of Landowners Coalseam Comm. to reform and clarify the court's approving settlement (pa) [Entry date 04/09/93]
502	4/9/93	NOTICE by defendant JM Huber Corporation of attorney change of address of Dugan & Associates (gc) [Entry date 04/12/93]
503	4/12/93	ORDER by Magistrate Judge Donald E. Abram granting joint motion for order to entry Case Mgmt Order No. 2 [498-1]. Joint motion on case management shall be

Sub #	Date	Description
		filed by 4/19/93 (cc: all counsel); entry date: 4/13/93 (gc) Entry date 04/13/93]
504	4/14/93	RESPONSE by defendant Amoco Production Co to Landowner's motion to amend proposed Case Mgmt Order No. 2 [499-1] (gc) [Entry date 04/15/93]
505	4/15/93	ORDER by Judge Lewis T. Babcock setting hearing on Landowners' motion for order for Pltf to give prompt notice to unnamed defendants [424-1], Landowners' motion to designate an additional class representative and amend case management order No. 1 to name Landowner Coalseam Committee as class representative for the subclass of mineral and overriding royalty owner defts [424-2], Landowners' motion to reform and clarify the court's order approving the settlements between the Southern Ute Indian Tribe and Markwest Energy, McKenzie Methan, SG Interests II, SG Interests I and Bellsouth Corp. [421-1], Landowners' motion for accounting, show cause order and assurances from Palo Petroleum, Inc. re: suspended royalty payments [428-1] at 9:00 5/19/93 (cc: all counsel); entry date: 4/16/93 (gc) [Entry date 04/16/93]
506	4/15/93	MINUTE ORDER: by Judge Lewis T. Babcock granting Landowners' motion to exceed page limitation of brief in support of motion to amend proposed management order no. 2 [500-1] (cc: all counsel); entry date: 4/16/93 (gc) [Entry date 04/16/93]
507	4/15/93	BRIEF by Landowner Coal Comm in support of motion to amend proposed Case Mgmt Order No. 2 [499-1] (gc) [Entry date 04/16/93]
508	4/15/93	ORDER by Judge Lewis T. Babcock. On 4/12/93 Mag. Abram ordered deft Amoco

Sub #	Date	Description
		and other defts to produce names and addresses of landowners to Southern Ute Indian Tribe by 4/19/93, but preserved issue of cost assessment [503-1]. Parties have to 5/14/93 to file briefs addressing effect of this order on Tribe's motion for reconsideration of magistrate's 3/1/93 order [458-1] quashing Tribe's subpoena and granting protective order (cc: all counsel); entry date: 4/19/93 (gc) [Entry date 04/19/93]
509	4/20/93	RESPONSE by plaintiff Southern Ute Indian to LOCC's motion to amend proposed Case Mgmt Order No. 2 [499-1] (gc)
510	4/22/93	Letter (STATEMENT) from Thomas H. Shipps of Maynes, Bradford, Shipps and Sheftel, counsel for plaintiff Southern Ute Indian with Exhibit a to pltf's response to LOCC's motion to amend proposed case management order no. 2 filed 4/20/93 that was inadvertenly omitted. [509-1] (gc)
511	4/22/93	ATTORNEY APPEARANCE for defendant McKenzie Methane as co-counsel by James Parker Rouse Sr. (gc) [Entry date 04/23/93]
512	4/23/93	Joint MOTION by plaintiff Southern Ute Indian, defendant McKenzie Methane for extension of time to obtain certain ratifications to the McKenzie Settlement Agreement (gc)
513	4/23/93	ORDER by Judge Lewis T. Babcock granting joint motion for extension of time to obtain certain ratifications to the McKenzie Settlement Agreement [512-1]. Period of ratification dated 4/16/92 is extended for additional 60 days for those certain individuals identified in said motion. Tribe and McKenzie granted additional period of 60

Sub #	Date	Description
		days to prepare and submit special ratification of settlement agreement re: work interests claimed (cc: all counsel); entry date: 4/23/93 (gc)
514	4/23/93	Joint MOTION by plaintiff Southern Ute Indian, defendant Markwest Energy Prt for extension of time to obtain ratifications of settlement agreement to 8/4/93 (gc)
515	4/26/93	ORDER by Judge Lewis T. Babcock granting motion for extension of time to obtain ratifications of settlement agreement between Tribe and MarkWest to 8/4/93 [514-1] (cc: all counsel); entry date: 4/26/93 (yk)
516	4/27/93	CASE MANAGEMENT ORDER No. 2 by Judge Lewis T. Babcock re [230-2] re [498-1]; Disp Motion ddl 8/26/93 (cc: all counsel); entry date: 4/28/93 (gc) [Entry date 04/28/93]
517	4/28/93	Joint MOTION by plaintiff Southern Ute Indian, defendant Amoco Production Co to Chief Magistrate Judge Abram for order to approve revised notice of pendency of class action and of class members (gc) [Entry date 04/29/93]
518	4/28/93	ORDER by Magistrate Judge Donald E. Abram granting joint motion to Chief Magistrate Judge Abram for order to approve revised notice of pendency of class action and of class members [517-1] (cc: all counsel); entry date: 4/29/93 (gc) [Entry date 04/29/93]
519	4/29/93	LETTER to court from James W. Wilson advising he supports a court order that 2% of the royalties from properties be set aside into fund for payment of atty fees and litigation expenses. (gc)

Sub #	Date	Description
520	5/3/93	RESPONSE by plaintiff Southern Ute Indian, defendant Amoco Production Co to order [508-1] of 4/15/93 (c) [Entry date 05/04/93]
521	5/6/93	LETTER to court from Kitty King Powell and Kity King Powell Maritial Trust re: setting aside a portionof the royalties to fund for payment of attorneys' fees and expenses of deft. class (gc) [Entry date 05/10/93]
522	5/6/93	RESPONSE by Landowner Coal Comm to SG Interests' motion for hearing on motions of Landowners Coalseam Comm. to reform and clarify the court's approving settlement [501-1] (gc) [Entry date 05/10/93]
522	5/6/93	MOTION (Request) by Landowner Coal Comm for an early decision re: LOCC's motion to give prompt notice to unnamed defts, to designate an additional class representative and to amend case management order No. 1 (gc) [Entry date 05/10/93]
523	5/10/93	Motion Objection (RESPONSE) by defendant Conoco, Inc. to pending motions filed by Landowners Coalseam Committee and Requesting Appearance (motion to reform and clarify the court's order approving the settlements between the Southern Ute Indian Tribe and Markwest Energy, McKenzie Methan, SG Interests II, SG Interests I and Bellsouth Corp. [421-1], motion for order for Pltf to give prompt notice to unnamed defendants [424-1], motion to designate an additional class representative and amend case management order No. 1 to name Landowner Coalseam Committee as class representative for the subclass of

Sub #	Date	Description
		mineral and overriding royalty owner defts [424-2]) (gc) [Entry date 05/11/93]
524	5/10/93	Motion Objecting (RESPONSE) by defendant Palo Petroleum, Inc. to Landowners Coalseam Committee's Motions and Notice of Appearance (motion for accounting, show cause order and assurances from Palo Petroleum, Inc. re: suspended royalty payments [428-1], motion to reform and clarify the court's order approving the settlements between the Southern Ute Indian Tribe and Markwest Energy, McKenzie Methan, SG Interests II, SG Interests I and Bellsouth Corp. [421-1], motion for order for Pltf to give prompt notice to unnamed defendants [424-1], motion to designate an additional class representative and amend case management order No. 1 to name Landowner Coalseam Committee as class representative for the subclass of mineral and overriding royalty owner defts [424-2]) (gc) [Entry date 05/11/93]
525	5/18/93	Renewal (AMENDMENT) by Ralph Wheeler, C. E. Wheeler to motion to intervene [218-1], motion for order designating intervenors as class representatives. [218-2] (gc)
526	5/18/93	Objection (RESPONSE) by CO Dept. of Transportation to LOCC's motion to represent CDOT and to establish fund [424-2] (gc) [Entry date 05/20/93]
528	5/19/93	COURTROOM MINUTES by Judge Lewis T. Babcock. Arguments . . . exhibits. The motion to designate an additional class representative is denied and request to have

Sub #	Date	Description
		2% withheld from royalties is moot (part of doc #424) and taking under advisement on 5/19/93 the amend case management order No. 1 to name Landowner Coalseam Committee as class representative for the subclass of mineral and overriding royaalty owner defts (part of [424-2]), denying Landowner's motion to reform and clarify the court's order approving the settlements between the Southern Ute Indian Tribe and Markwest Energy, McKenzie Methan, SG Interests II, SG Interests I and Bellsouth Corp. [421-1]. Case further referred to Mag. Abram to work with parties to establish benchmark form or protocol for submission of future settlement agreements. Pltf. to submit to court and Landowners the mailing list received from Amoco. List to remain confidential. Pltf to submit under seal the mailing list they received from all others. Lists to remain confidential. Court conditionally approves settlement agreement with Pltf. and SG 1 and Bellsouth, pending SG I's agreement to delete last sentence of paragraph 9.04. Court will review pltf's motion to amend [323-1]. Finding the Landowner's motion for accounting, show cause order and assurances from Palo Petroleum, Inc. re: suspended royalty payments [428-1] withdrawn without prejudice (moot) (Exhibit list and exhibits attached).; entry date: 5/21/93 (gc) (Entry date 05/21/93]
527	5/20/93	LETTER to court from Stanley E. Neely re: request for court order that 2% of royalties be placed in fund for atty fees and expenses. (gc)

Sub #	Date	Description
529	5/20/93	ORDER by Judge Lewis T. Babcock that the motion to approve settlement agreement and to dismiss claims against SG Interests I, Ltd. and Bellsouth Corp Health Care Trust before Judge Lewis T. Babcock. [418-1] is submitted. The settlement agreement will be approved, conditioned on the removal of the last sentence of paragraph f 04 of Article IX and is incorporated as part of this order. Parties to settlement agreement shall have 30 days to submit to the court notice of their consent to the above stated condition. Upon final approval, parties to make diligent efforts to notify persons/entities eligible to ratify settlement agreement, etc. (cc: all counsel) ; entry date: 5/21/93 (gc) [Entry date 05/21/93]
530	5/20/93	ORDER by Judge Lewis T. Babcock granting Tribe's motion to amend complaint (to correct errors in names of certain defts, substitute trustees of trusts in place of individual defts, delete names of other defts and add defts) [323-1] (cc: all counsel) ; entry date: 5/21/93 (gc) [Entry date 5/21/93]
532	5/20/93	First AMENDED COMPLAINT [1-1] by plaintiff Southern Ute Indian terminating defendant Leta M. Adkins, defendant Horace F. Buchanan, defendant Joseph C. Ciancio, defendant A. B. Crosby, defendant Barbara Crosby, defendant David Crosby, defendant Manuel Cruz, defendant Minnie Flaks, defendant Adele Frost, defendant Hondo Oil & Gas Co, defendant Richard C. Malcomb, defendant Mabel McElvain, defendant W Clay Meredith Trst, defendant Roy E. Montgomery, defendant Clinton I.

Sub #	Date	Description
		Smullyen, defendant Benton E. Smullyen, defendant Albert E. Zarlengo, defendant Kelly Cox, defendant Christine Hamilton, defendant W. E. Rennie, defendant George C. Vance; adding ARCO Oil and Gas Co., Jack Balle, Mary Jean Balle, Donald C. Ciancio, Susie M. Ciancio, NCNB Texas Natl Bk, Addie G. Crosby, Jack W. Crosland Jr., Henry L. Enochson, Mary Jane Enochson, J. L. Goggans, Liberty Tulsa, Helen Crosland Hendricks, Thomas L. Johnstone, James Eric Kaindl, Larry James Kaindl, Lisa Jean Kaindl, Jane P. Mosbacher, PM Associates, First Intrst Bk Dnvr, Roderick L. Turner, Wells Fargo Bank, Albert E. Zarlengo Jr., Bell So Corp Trst, J. Magness, Inc., SG Interests I, Ltd (gc) [Entry date 05/25/93]
531	5/21/93	LETTER to court from J.M. Nash, Jr., Pyramid Trust to court regarding notice of hearing on 5/19/93 he recently received. (gc) [Entry date 05/25/93]
533	5/24/93	ORDER by Judge Lewis T. Babcock denying LOCC's motion for order for Pltf to give prompt notice to unnamed defendants [424-1] denying LOCC's motion to designate an additional class representative and amend case management order No. 1 to name Landowner Coalseam Committee as class representative for the subclass of mineral and overriding royaalty owner defts [424-2]. Tribe to submit under seal to court and to LOCC its mailing list of Amoco's mineral owners and overriding royalty owner defts and mailing lists of all other deft oil companies' mineral and overriding royalty owners. Denying LOCC's motion to reform and clarify the

Sub #	Date	Description
		court's order approving the settlements between the Southern Ute Indian Tribe and Markwest Energy, McKenzie Methan, SG Interests II, SG Interests I and Bellsouth Corp. [421-1], Issue of future settlement agreements referred to Mag. Abram who will act ac settlement master . . . granting LOCC's motion to withdraw without prejudice its motion for accounting, show cause order and assurances from Palo Petroleum, Inc. re: suspended royalty payments [428-1] (cc: all counsel); entry date: 5/26/93 (gc) [Entry date 05/26/93]
534	5/25/93	NOTICE by defendant Amoco Production Co of taking deposition of STEPHEN L. BEND on 6/7/93 at 10:00 am (gc) [Entry date 05/26/93]
535	5/25/93	NOTICE by defendant Amoco Production Co of taking deposition of CLARENCE L. HARR on 6/17/93 at 9:30 am (gc) [Entry date 05/26/93]
536	5/25/93	NOTICE by defendant Amoco Production Co of taking deposition of J. CRAIG CREEL on 6/1/93 at 10:00 am (gc) [Entry date 05/26/93]
537	5/26/93	ANSWER by defendant Amoco Production Co to first amended complaint [532-1] (gc) [Entry date 06/01/93]
538	5/27/93	RESPONSE by defendant Richmond Petroleum to order [533-1] dated 5/24/93 regarding submittal of mailing lists (gc) [Entry date 06/01/93]
539	5/28/93	MOTION by defts Meridian Oil, Inc., Amax Oil & Gas, Inc., Pablo Operating Co for order for modification of order dated 5/24/93 (gc) [Entry date 06/01/93]

Sub #	Date	Description
540	5/28/93	ANSWER by Defts Meridian Oil, Inc., Amax Oil & Gas, Inc., Pablo Operating Co to First Amended complaint [532-1] (gc) [Entry date 06/01/93]
541	5/28/93	ANSWER by defendant Richmond Petroleum First Amended complaint [532-1] (gc) [Entry date 06/01/93]
542	5/28/93	ORDER by Judge Lewis T. Babcock denying Ralph Wheeler and C.E. Wheeler's motion to intervene [218-1] and motion for order designating intervenors as class representatives. [218-2] (cc: all counsel); entry date: 6/1/93 (gc) [Entry date 06/01/93]
543	6/1/93	OBJECTIONS by defendant Fuel Resources Dev, defendant Natl Coop Refinery to release of ownership lists (re order [533-1] of 5/24/93) (gc) [Entry date 06/02/93]
544	6/1/93	ANSWER by defendant North Central Oil to first amended complaint [532-1] (gc) [Entry date 06/02/93]
545	6/1/93	ANSWER by defendant Mobil Oil Corp to first amended complaint [532-1] (gc) [Entry date 06/02/93]
546	6/2/93	MINUTE ORDER: by Judge Lewis T. Babcock. Responses due by 6/16/93 to motion of Meridian, et al for modication of order dated 5/24/93 [539-1] (cc: all counsel); entry date: 6/2/93 (gc)
547	6/7/93	JOINDER by defendant Amoco Production Co in motion for order for modification of order dated 5/24/93 [539-1] (gc) [Entry date 06/08/93]
550	6/8/93	ANSWER by defendant Bowen/Edwards Assoc complaint [532-1] (gc) [Entry date 06/09/93]

Sub #	Date	Description
551	6/8/93	ANSWER by defendant Tiffany Gas Company to 1st amended complaint [532-1] (gc) [Entry date 06/09/93]
548	6/9/93	MINUTE ORDER: by Magistrate Judge Donald E. Abram; mag conference set at 3:30 6/22/93 (cc: all counsel); entry date: 6/9/93 (yk)
549	6/9/93	Certication of Publication and NOTICE by plaintiff Southern Ute Indian w/exhibits FILED UNDER SEAL, PLACED IN VAULT (yk)
552	6/10/93	ANSWER by defendant Northwest Pipeline, defendant Williams Production first amended complaint [532-1] (pa) [Entry date 06/11/93]
553	6/14/93	Joint MOTION by Landowner Coal Comm, Southern Ute Indian, Northwest Pipeline to Chief Judge Abram to review Palo Settlement Agreement (gc) [Entry date 06/15/93]
554	6/15/93	Motion by defendant Amoco Production Co for summary judgment on the class action claim and the class action defenses before Judge Lewis T. Babcock, and for leave to file brief in excess of ten pages before Judge Lewis T. Babcock (gc) [Entry date 06/16/93]
555	6/15/93	BRIEF by defendant Amoco Production Co in support of motion for summary judgment on the class action claim and the class action defenses before Judge Lewis T. Babcock [554-1] (Bound Volume) (gc) [Entry date 06/16/93]
556	6/15/93	APPENDIX filed by defendant Amoco Production Co of Exhibits containing CON-

Sub #	Date	Description
		FIDENTIAL OR HIGHLY CONFIDENTIAL information re brief in support of its motion for summary judgment on the class action claim and the class action defenses [555-1] (PLACED IN VAULT) (gc) [Entry date 06/16/93]
557	6/15/93	APPENDIX (Volume I) filed by defendant Amoco Production Co re brief in support of its motion for summary judgment on class action claim and class action defenses [555-1] (Bound volume) (gc) [Entry date 06/16/93]
558	6/15/93	APPENDIX (Volume II) filed by defendant Amoco Production Co re brief in support of its motion for summary judgment on the class action claim and class action defenses [555-1] (Bound Volume) (gc) [Entry date 06/16/93]
559	6/15/93	APPENDIX (Volume III) filed by defendant Amoco Production Co re brief in support of its motion for summary judgment on the class action claim and class action defenses [555-1] (Bound Volume) (gc) [Entry date 06/16/93]
560	6/16/93	SUPPLEMENTAL concurrence by defendant Palo Petroleum, Inc. in joint motion to Chief Judge Abram to review Palo Settlement Agreement [553-1] (gc) [Entry date 06/17/93]
561	6/17/93	RESPONSE by Landowner Coal Comm to Meridian Oil, et al's motion for order for modification of order dated 5/24/93 [539-1] (gc)
561	6/17/93	RESPONSE by Landowner Coal Comm to Fuel Resources and Nat'l Cooperative ob-

Sub #	Date	Description
		jection to release of ownership lists [543-1] (gc)
562	6/17/93	Motion by plaintiff Southern Ute Indian, defendant Pablo Operating Co to dismiss claims against Pablo Operating Co and certain other claims before Judge Lewis T. Babcock (yk)
563	6/17/93	ANSWER by defendant Phillips Petroleum to amended complaint [532-1] (yk)
564	6/17/93	Notice (STATEMENT) by defendant SG Interests I, Ltd, plaintiff Southern Ute Indian of consent to conditional approval of settlement of pltf and deft SG and Bellsouth re [529-1], [418-1] (gc) [Entry date 06/18/93]
565	6/18/93	Supplemental Certification of Notification with Exhibits Under SEAL by plaintiff Southern Ute Indian (Placed in Vault) (gc)
566	6/22/93	MOTION by defendant Palo Petroleum, Inc. for attorney Mark J. Thurber and Claudia W. Frost to appear pro hac vice (gc) [Entry date 06/23/93]
567	6/22/93	Stipulation and MOTION by Landowner Coal Comm, Amoco Production Co, Meridian Oil, Inc., Amax Oil & Gas, Inc., Pablo Operating Co, Fuel Resources Dev, Natl Coop Refinery for modication of 5/24/93 order re: release of mailing lists (gc) [Entry date 06/23/93]
568	6/22/93	ORDER by Judge Lewis T. Babcock granting motion for attorney Mark J. Thurber and Claudia W. Frost to appear pro hac vice [566-1] (cc: all counsel); entry date: 6/24/93 (gc) [Entry date 06/24/93]

Sub #	Date	Description
569	6/23/93	ORDER by Judge Lewis T. Babcock granting Amoco's motion for leave to file brief in excess of ten pages before Judge Lewis T. Babcock [554-2] (cc: all counsel); entry date: 6/24/93 (gc) [Entry date 06/24/93]
570	6/24/93	ORDER by Judge Lewis T. Babcock granting motion to approve settlement agreement and to dismiss claims against SG Interests I, Ltd. and Bellsouth Corp Health Care Trust before Judge Lewis T. Babcock. [418-1]. Except for last sentence of paragraph 9.04 of Article IX, the settlement agreement is approved and incorporated as part of this order. All claims of pltf. against SG Interests I, Ltd and BellSouth Corp. Health Care Trust are dismissed with prejudice. Partes to make diligent efforts to notify persons or entities eligible to ratify agreement. terminating party SG Interests I, Ltd, party Bell So Corp Trst (cc: all counsel); entry date: 6/24/93 (gc)
571	6/24/93	ORDER by Judge Lewis T. Babcock granting motion to dismiss claims against Pablo Operating Co and certain other claims before Judge Lewis T. Babcock [562-1]. As to certain lands (see order for detail), the Tribe's claims in complaint are dismissed with prejudice. Those persons claiming an interest in coalbed methane development in said lands are similarly dismissed with prejudice only insofar as their claimed interests are located within said spacing units. Patricia Penrose Schieffer and the Trust U/D Donaldson Brown and other persons named in exhibit (attached to order) claiming such interests are similarly

Sub #	Date	Description
		dismissed with prejudice only insofar as their claimed interests subject to this case are located within said spacing units. All parties to bear their own costs and fees, terminating party Pablo Operating Co (cc: all counsel); entry date: 6/24/93 (gc)
572	6/24/93	ORDER by Judge Lewis T. Babcock granting motion for modification of 5/24/93 order re: release of mailing lists [567-1] (cc: all counsel); entry date: 6/25/93 (yk) [Entry date 06/25/93]
573	6/28/93	LETTER to court from counsel for defendant Conoco, Inc. requesting that he be removed from mailing list as Conoco was dismissed on 4/1/93 (gc) [Entry date 06/29/93]
574	6/29/93	TRANSCRIPT of proceedings of Hearing on Motions dated 5/19/93 before Judge Babcock (170 pages) (Cert. Copy) (dh) [Entry date 06/30/93]
575	7/6/93	Supplemental EXHIBITS by Amoco Prod Co. to be added to Appendix III [559-1] filed with the brief in support of [555-1] Amoco's motion for summary judgment on the class action claim and the class action defenses before Judge Lewis T. Babcock [554-1]. (sh) [Entry date 07/07/93]
576	7/7/93	Supplemental CERTIFICATION of Notification (of Class Members) With Exhibits by plaintiff Southern Ute Indian—FILED UNDER SEAL and PLACED IN THE VAULT. (sh)
577	7/9/93	MOTION by plaintiff Southern Ute Indian to extend time to file its response to Amoco's Motion for Summ Judgment, and

Sub #	Date	Description
		to extend time to file its cross-motion for summ judgment. (sh)
578	7/13/93	Supplemental CERTIFICATE of Service by plaintiff Southern Ute Indian re Pltfs' Request for Extension of time to File its Response to Amoco's Motion for Summ Judgment & to File its Cross-Motion for Summ Judgment—copy mailed to the Southern Ute Indian Tribe. (sh)
579	7/14/93	Motion by Federal Defendants to dismiss this action as time-barred by 28 U.S.C. Sec. 2401 before Judge Lewis T. Babcock, or, alternatively, for summary judgment that, inter alia, Plf Tribe does not own the coalbed methane before Judge Lewis T. Babcock, and to exceed page limitation. (sh)
580	7/14/93	BRIEF by Federal Defendants in support of Federal Defts' motion to dismiss this action as time-barred by 28 U.S.C. Sec. 2401 before Judge Lewis T. Babcock [579-1], motion for summary judgment that, inter alia, Plf Tribe does not own the coalbed methane before Judge Lewis T. Babcock [579-2]. (sh)
581	7/16/93	ORDER by Judge Lewis T. Babcock granting pltf's motion to extend time to file its response to Amoco's Motion for Summ Judgment [577-1] to 9/7/93 granting pltf's motion to extend time to file its cross-motion for summ judgment. [577-2] to 9/7/93 re [554-1] (cc: all counsel); entry date: 7/20/93 (gc) [Entry date 07/20/93]
582	7/16/93	MINUTE ORDER: by Judge Lewis T. Babcock. Pltf has to 9/7/93 to respond to Federal Defts' Motion to Dismiss Action as Time-Barred [579-1] or in the Alterna-

Sub #	Date	Description
		tive for Summary Judgment [579-2], granting Federal Defts' motion to exceed page limitation. [579-3]. Brief is accepted for filing. (cc: all counsel); entry date: 7/20/93 (gc) [Entry date 07/20/93]
583	7/19/93	ORDER by Magistrate Judge Donald E. Abram. Pltf to promptly release all mineral owners names and addresses, supplied by Deft. Oil Companies, to LOCC to be maintained in accordance with court's previous orders. (cc: all counsel); entry date: 7/20/93 (gc) [Entry date 07/20/93]
584	7/19/93	ORDER OF SETTLEMENT MASTER by Magistrate Judge Donald E. Abrams. Palo settlement Agreement is approved as to form, subject to ultimate approval by Judge Babcock. re [553-1] (cc: all counsel); entry date: 7/20/93 (gc) [Entry date 07/20/93]
585	8/6/93	ORDER by Judge Lewis T. Babcock granting motion to review Palo Settlement Agreement [553-1] Settlement agreement between Tribe and Palo Petroleum is approved and incorporated as part of this order. All claims of Tribe against Palo are dismissed with prejudice. Tribe and Palo to make diligent efforts to notify persons or entities eligible to ratify settlement agreement. terminating party Palo Petroleum, Inc. (cc: all counsel); entry date: 8/9/93 (gc) [Entry date 08/09/93]
586	9/7/93	Motion by plaintiff Southern Ute Indian for summary judgment before Judge Lewis T. Babcock (gc) [Entry date 09/08/93]
586	9/7/93	RESPONSE by plaintiff Southern Ute Indian to Amoco's motion for summary judg-

Sub #	Date	Description
		ment on the class action claim and the class action defenses before Judge Lewis T. Babcock [554-1], and Federal Defts' motion to dismiss this action as time-barred by 28 U.S.C. Sec. 2401 before Judge Lewis T. Babcock [579-1] or in the alternative for motion for summary judgment that, inter alia, Plf Tribe does not own the coalbed methane before Judge Lewis T. Babcock [579-2] (gc) [Entry date 09/08/93]
587	9/7/93	MOTION by plaintiff Southern Ute Indian for leave to file brief in support of Tribe's cross motion for summary judgment and response to Amoco's motion for summary judgment and response to Federal Defts' alternative motion to dismiss or for summary judgment in excess of 10 pages (gc) [Entry date 09/08/93]
588	9/7/93	CERTIFICATE by plaintiff Southern Ute Indian of mailing of Brief in Support of Tribe's Motion for Summary Judgment, etc. on 9/7/93 (gc) [Entry date 09/08/93]
589	9/7/93	BRIEF by plaintiff Southern Ute Indian in support of motion for summary judgment before Judge Lewis T. Babcock [586-1] (Filed under SEAL, along with Volumes 1 through 6 (10 total separate envelopes)—placed in VAULT) (NOTE: Per Stip and Order granting it 7/11/94, this brief is now UNSEALED and the brief & volumes 1-6 have been transferred to the EXHIBIT ROOM.) (gc) [Entry date 09/08/93] [Edit date 07/13/94]
589	9/7/93	BRIEF by plaintiff Southern Ute Indian in opposition to Amoco's motion for summary judgment on the class action claim and the class action defenses before Judge Lewis

Sub #	Date	Description
		T. Babcock [554-1] and Federal Defts' motion to dismiss this action as time-barred by 28 U.S.C. Sec. 2401 before Judge Lewis T. Babcock [579-1], or in the alternative motion for summary judgment that, inter alia, Plf Tribe does not own the coalbed methane before Judge Lewis T. Babcock [579-2] (Filed under SEAL—along with volumes 1 through 6 (consisting of 10 separate envelopes)—placed in Vault) (Per Stip granted 7/11/94, this brief and volumes 1-6 are now UNSEALED and this box has been transferred to the EXHIBIT ROOM.) (gc) [Entry date 09/08/93] [Edit date 07/13/94]
590	9/7/93	ORDER by Judge Lewis T. Babcock granting Tribe's motion for leave to file brief in support of Tribe's cross motion for summary judgment and response to Amoco's motion for summary judgment and response to Federal Defts' alternative motion to dismiss or for summary judgment in excess of 10 pages [587-1] (cc: all counsel); entry date: 9/9/93 (gc) [Entry date 09/09/93]
591	9/8/93	Unopposed MOTION by defendant Amoco Production Co for leave to file combined reply and response brief to summary judgment motions (gc) [Entry date 09/09/93]
592	9/9/93	MINUTE ORDER: by Judge Lewis T. Babcock granting Amoco's unopposed motion for leave to file combined reply and response brief to summary judgment motions [591-1]. Brief due 10/18/93 (cc: all counsel); entry date: 9/14/93 (gc) [Entry date 09/14/93]

Sub #	Date	Description
593	9/20/93	Unopposed MOTION by Federal defendants for enlargement of time to respond to pltf's response brief and cross-motions to dismiss and for summary judgment to 10/18/93 (gc) [Entry date 09/21/93]
594	9/21/93	MINUTE ORDER: by Judge Lewis T. Babcock granting Federal Defts' motion for enlargement of time to respond to pltf's response brief and cross-motions to dismiss and for summary judgment to 10/18/93 [593-1] (cc: all counsel); entry date: 9/21/93 (gc)
595	9/23/93	Unopposed MOTION by defendant Richmond Petroleum for leave to file combined reply and response brief re: motions for summary judgment (gc) [Entry date 09/24/93]
596	9/23/93	MINUTE ORDER: by Judge Lewis T. Babcock granting Richmond Petroleum's motion for leave to file combined reply and response brief re: motions for summary judgment [595-1]. Brief is due 10/18/93 (cc: all counsel); entry date: 9/24/93 (gc) [Entry date 09/24/93]
597	9/24/93	Unopposed MOTION by Landowner Coal Comm for leave to file combined reply and response brief re: motions for summary judgment (gc)
598	9/24/93	MINUTE ORDER: by Judge Lewis T. Babcock granting Land Owners Coalseam Comm's motion for leave to file combined reply and response brief re: motions for summary judgment [597-1]. Brief due 10/18/93 (cc: all counsel); entry date: 9/24/93 (gc)

Sub #	Date	Description
599	9/27/93	MANDATE from the Court of Appeals; CA # 92-1201; Dt issued 9/27/93; JUDGMENT dated 8/10/93 reversing the order requiring the Tribe to pay to defts 25% of costs already expended by defts to acquire necessary business information and remanding for further proceedings. [Appeal [296-1] (gc) [Entry date 09/28/93]
611	9/27/93	Unopposed MOTION by defendant Amoco Production Co for second extension of time to 11/9/93 to file combined reply & response brief. (sh) [Entry date 10/28/93]
600	10/5/93	MOTION by defendant Amoco Production Co to extend time to 11/3/93 to file combined reply & response brief. (sh)
601	10/5/93	MINUTE ORDER: by Judge Lewis T. Babcock granting Amoco's motion to extend time to 11/3/93 to file combined reply & response brief [600-1]. (cc: all counsel); entry date: 10/5/93 (sh)
602	10/13/93	MOTION by defendant Richmond Petroleum to extend time to 11/3/93 to file Combined reply & response brief to Tribe's Motion for Summ Judgment & Amoco's Motion for Summ Judgment & response to Federal Defts' alternative motion to dismiss or for summ judgment. (sh) [Entry date 10/14/93]
603	10/14/93	MINUTE ORDER: by Judge Lewis T. Babcock granting Richmond Petroleum's motion to extend time to 11/3/93 to file Combined reply & response brief to Tribe's Motion for Summ Judgment & Amoco's Motion for Summ Judgment & response to Federal Defts' alternative motion to dismiss or for summ judgment [602-1]. (cc: all counsel); entry date: 10/14/93 (sh)

Sub #	Date	Description
604	10/14/93	MOTION by Federal Defts Manuel Lujan Jr., DOI, BIA, BLM, Minerals Mgt Service to extend time to 11/3/93 to respond to Plf's Response & Cross-Motion. (sh) [Entry date 10/15/93]
605	10/15/93	MOTION by Land Owners Coalseam Committee to extend time to 11/3/93 to file Combined Reply & Response Brief. (sh)
606	10/15/93	MINUTE ORDER: by Judge Lewis T. Babcock granting Federal Defts' motion to extend time to 11/3/93 to respond to Plf's Response & Cross-Motion [604-1]. (cc: all counsel); entry date: 10/15/93 (sh)
607	10/15/93	ATTORNEY SUBSTITUTION: terminating attorney Frederick Lee Douglas/Kelly Stansfield & O'Donnell for Natl Coop Refinery, and Fuel Resources Dev and substituting attorney Charles Carpenter (with new address). (sh)
608	10/15/93	Unopposed MOTION by defendant Fuel Resources Dev to extend time to 11/3/93 to file response brief. (sh)
609	10/15/93	MINUTE ORDER: by Judge Lewis T. Babcock granting Land Owners Coalseam's motion to extend time to 11/3/93 to file Combined Reply & Response Brief [605-1]. (cc: all counsel); entry date: 10/18/93 (sh) [Entry date 10/18/93]
610	10/15/93	MINUTE ORDER: by Judge Lewis T. Babcock granting Fuelco's motion to extend time to 11/3/93 to file response brief [608-1]. (cc: all counsel); entry date: 10/18/93 (sh) [Entry date 10/18/93]

Sub #	Date	Description
612	10/28/93	MINUTE ORDER: by Judge Lewis T. Babcock granting Amoco's motion for second extension of time to 11/9/93 to file combined reply & response brief [611-1]. (cc: all counsel); entry date: 10/28/93 (sh)
613	11/1/93	MOTION by plaintiff Southern Ute Indian for leave to lodge executed Palo Petroleum, Inc. Settlement Agreement with the Court. (sh)
614	11/4/93	ORDER by Judge Lewis T. Babcock granting motion for leave to lodge executed Palo Petroleum, Inc. Settlement Agreement with the Court. [613-1] (cc: all counsel); entry date: 11/8/93 (yk) [Entry date 110893]
615	11/9/93	REPLY and Response by defendant Richmond Petroleum to response to motion for summary judgment before Judge Lewis T. Babcock [586-1], motion for summary judgment on the class action claim and the class action defenses before Judge Lewis T. Babcock [554-1] (pa) [Entry date 11/10/93]
616	11/9/93	MOTION by federal defts to exceed page limitation (pa) [Entry date 11/10/93]
617	11/9/93	RESPONSE by defendant Manuel Lujan Jr. to motion for summary judgment before Judge Lewis T. Babcock [586-1] (pa) [Entry date 11/10/93]
617	11/9/93	REPLY by defendant Manuel Lujan Jr. to response to motion for summary judgment that, inter alia, Plf Tribe does not own the coalbed methane before Judge Lewis T. Babcock [579-2] (pa) [Entry date 11/10/93]
618	11/9/93	MOTION by defendant Fuel Resources Dev to exceed page limitation -brief responding to mtn for sum jug (pa) [Entry date 11/10/93]

Sub #	Date	Description
619	11/9/93	RESPONSE by defendant Fuel Resources Dev to Tribe's motion for summary judgment before Judge Lewis T. Babcock [586-1] (pa) [Entry date 11/10/93]
620	11/9/93	MOTION by defendant Amoco Production Co to exceed page limitation - combined reply and response brief (pa) [Entry date 11/10/93]
621	11/9/93	REPLY by defendant Amoco Production Co to response to motion for summary judgment before Judge Lewis T. Babcock [586-1] (Combined Reply and Response Brief, bound volume, 189 pages) (pa) [Entry date 11/10/93] [Edit date 11/10/93]
621	11/9/93	RESPONSE in support by defendant Amoco Production Co to motion for summary judgment on the class action claim and the class action defenses before Judge Lewis T. Babcock [554-1] (Combined Reply and Response Brief, bound volume) (pa) [Entry date 11/10/93] [Edit date 11/10/93]
622	11/9/93	APPENDIX VOLUME I filed by defendant Amoco Production Co re motion response [621-1], re motion reply [621-], (bound volume, (pa) [Entry date 11/10/93]
623	11/9/93	APPENDIX VOLUME II filed by defendant Amoco Production Co re motion response [621-1], re motion reply [621-1] (bound volume) (pa) [Entry date 11/10/93]
624	11/9/93	SECOND APPENDIX OF exhibits filed by defendant Amoco Production Co containing confidential or highly confidential information submitted separately FILED UNDER SEAL re motion response [621-1], re motion reply [621-1] PLACED IN VAULT (pa) [Entry date 11/10/93]

Sub #	Date	Description
625	11/10/93	MOTION by Landowners Coalseam for order to give prompt notice to unnamed defendants (yk) [Entry date 11/12/93]
626	11/10/93	MOTION by Landowners Coalseam to amend case management order no. 1 (yk) [Entry date 11/12/93]
627	11/10/93	Motion by Landowners Coalseam to dismiss action as time barred; for lack of jurisdiction and alternatively for Mineral Owner defs on class action claim and class action defenses before Judge Lewis T. Babcock and for leave to file brief in excess of 10 pages (yk) [Entry date 11/12/93]
628	11/10/93	CERTIFICATE of mailing by Landowners Coalseam (yk) [Entry date 11/12/93]
629	11/10/93	REPLY by Landowners Coalseam to response to motion for summary judgment that inter alia, Plf Tribe does not own the coalbed methane before Judge Lewis T. Babcock [579-2], motion for summary judgment on the class action claim and the class action defenses before Judge Lewis T. Babcock [554-1] (yk) [Entry date 11/12/93]
629	11/10/93	RESPONSE by Landowners Coalseam to motion for summary judgment before Judge Lewis T. Babcock [586-1] (yk) [Entry date 11/12/93]
629	11/10/93	BRIEF by Landowners Coalseam in support of motion to dismiss action as time barred; for lack of jurisdiction and alternatively for Mineral Owner defs on class action claim and class action defenses before Judge Lewis T. Babcock [627-1], motion to amend case management order no. 1 [626-1] (yk) [Entry date 11/12/93] [Edit date 10/24/94]

Sub #	Date	Description
630	11/10/93	EXHIBITS 1-13 for motion response [629-1], motion reply [629-1], brief [629-1] (yk) [Entry date 11/12/93]
631	11/10/93	MINUTE ORDER: by Judge Lewis T. Babcock regarding [627-1] mtn to file excess pages granted (cc: all counsel); entry date: 11/12/93 (yk) [Entry date 11/12/93]
632	11/10/93	ORDER by Judge Lewis T. Babcock granting motion to exceed page limitation -brief responding to mtn for sum jug [618-1] (cc: all counsel); entry date: 11/12/93 (yk) [Entry date 11/12/93]
633	11/10/93	ORDER by Judge Lewis T. Babcock granting motion to exceed page limitation [616-1] (cc: all counsel); entry date: 11/12/93 (yk) [Entry date 11/12/93]
634	11/10/93	MINUTE ORDER: by Judge Lewis T. Babcock granting motion to exceed page limitation - combined reply and response brief [620-1] (cc: all counsel); entry date: 11/12/93 (yk) [Entry date 11/12/93]
635	11/10/93	MINUTE ORDER: by Judge Lewis T. Babcock denying motion to amend case management order no. 1 [626-1] (cc: all counsel); entry date: 11/12/93 (yk) [Entry date 11/12/93]
636	11/15/93	LETTER to court from VivianGuilford of Colo Atty Gen requesting removal of Ms. Charlotte Robinson from mailing list (yk)
637	11/23/93	Unopposed MOTION by plaintiff Southern Ute Indian to extend to file reply brief re Tribe's Cross Motion for Sum Judgment (pa) [Entry date 11/24/93]
638	11/23/93	ORDER by Judge Lewis T. Babcock granting motion to extend to file reply brief re

Sub #	Date	Description
		Tribe's Cross Motion for Summary Judgment to 1/18/94 [637-1] (cc: all counsel); entry date: 11/24/93 (pa) [Entry date 11/24/93]
639	12/2/93	Joint MOTION by plaintiff Southern Ute Indian, defendant Markwest Energy Prt and Land Owners Coalseam Committee for order to approve Landowner Ratification of Markwest Settlement Agreement. (sh)
640	12/3/93	BRIEF FILED by plaintiff Southern Ute Indian—Memorandum to Chief Magistrate Abram in Support of Disclosure of Federal Defts' Documents Submitted for In Camera Review. (sh) [Entry date 12/06/93]
641	1/5/94	Second MOTION by plaintiff Southern Ute Indian to extend time to 2/22/94 for filing Plf's reply brief or briefs. (sh)
642	1/5/94	ORDER by Judge Lewis T. Babcock granting Plf's motion to extend time to 2/22/94 for filing Plf's reply brief or briefs [641-1]. (cc: all counsel); entry date: 1/6/94 (sh) [Entry date 01/06/94]
643	1/10/94	ORDER—upon in camera review of documents by Magistrate Judge Donald E. Abram — the 3/28/90 memorandum, the draft 1990 opinions, and the 3/18/93 memorandum from Young & Aguilar to BIA solicitor are to be produced to counsel for Plf. The remaining documents need not be produced. (cc: all counsel); entry date: 1/10/94 (sh)
644	1/10/94	MAGISTRATE'S RECOMMENDATION by Magistrate Judge Donald E. Abram recommending that the joint motion for order to approve Landowner Ratification of Markwest Settlement Agreement [639-1]

Sub #	Date	Description
		be approved. Also recommended that MarkWest be ordered to submit the cover letter & MarkWest Ratification to each mineral/royalty owner deft who owns an interest in MarkWest's leaseholds subject to this litigation, to be returned by 3/31/94. Parties given 10 days to file written objections to this Recommendation. (cc: all counsel); entry date: 1/10/94 (sh)
645	1/14/94	LETTER to court from Vivian Guilford, Admin Asst for Natural Resources Section, State of Colo requesting that her name be removed from the Certificate of Mailing in this case. (sh)
646	1/28/94	ORDER by Judge Lewis T. Babcock adopting [644-1] Magistrate's Recommendation; APPROVING [639-1] Land Owner Coalseam Committee/Southern Ute Indian Tribe/MarkWest Energy's motion for order to approve Landowner Ratification of Markwest Settlement Agreement. MarkWest to submit Cover Letter & Ratification to each mineral/royalty owner deft who owns an interest in MarkWest's leaseholds subject to this litigation. Time period for execution/return by the owners extended through 3/31/94. Upon execution & return to MarkWest, this Ratification shall supersede/replace previous ratifications executed by that mineral/royalty owner. (cc: all counsel); entry date: 2/1/94 (sh) [Entry date 02/01/94]
647	2/22/94	MOTION by plaintiff Southern Ute Indian to file brief in support of Plf's Reply brief in support of Plf's Cross Motion for Summ Judgment Against the Class Action Defts & the Federal Defts that exceeds page limitation (10 pages). (sh)

Sub #	Date	Description
648	2/22/94	REPLY by plaintiff Southern Ute Indian to Class Action Defts & Federal Defts' responses to Plf's motion for summary judgment before Judge Lewis T. Babcock [586-1]. (NOTE: This document has been FILED UNDER SEAL and HAS BEEN PLACED IN THE VAULT.) (FURTHER NOTE: Per stipulation & court's order granting it 7/11/94, this document has been UNSEALED and is now available in the file.) (sh) [Edit date 07/13/94]
649	2/22/94	Volume 7: EXHIBITS to Plf's motion reply [648-1] to Plf's motion for summary judgment before Judge Lewis T. Babcock [586-1]. (NOTE: This document has been FILED UNDER SEAL and has been PLACED IN THE VAULT.) (sh)
650	2/22/94	LETTER to court from counsel for plaintiff Southern Ute Indian—enclosing original and copy of their Moiton for Leave to file . . . . in excess of 10 pages, proposed order, Tribe's reply brief in support of Tribe's Cross Motion for Summ Judgment . . ., and Volume 7 of Exhibits & Certificates of Service. (sh)
651	2/23/94	ORDER by Judge Lewis T. Babcock granting Plf's motion to file brief in support of Plf's Reply brief in support of Plf's Cross Motion for Summ Judgment Against the Class Action Defts & the Federal Defts that exceeds page limitation (10 pages) [647-1]. (cc: all counsel); entry date: 2/23/94 (sh)
652	4/14/94	MOTION by plaintiff Southern Ute Indian for order to unseal Tribe's Opening Brief & Reply Brief & the Tribe's Exhibits re Tribe's Cross-Motion for Summ Judgment Against the Class Action Defts & Federal Defts. (sh) [Edit date 04/18/94]

Sub #	Date	Description
653	4/18/94	MINUTE ORDER: by Judge Lewis T. Babcock regarding all parties given to 4/29/94 to respond to [652-1] Plf's motion for order to unseal Tribe's Opening Brief & Reply Brief & the Tribe's Exhibits re Tribe's Cross-Motion for Summ Judgment Against the Class Action Defts & Federal Defts. (cc: all counsel); entry date: 4/18/94 (sh)
654	4/29/94	OBJECTIONS by Federal Defts to Plf's motion for order to unseal Tribe's Opening Brief & Reply Brief & the Tribe's Exhibits re Tribe's Cross-Motion for Summ Judgment Against the Class Action Defts & Federal Defts [652-1]. (sh)
655	5/3/94	Correction & Substitution to CERTIFICATE of Service of Federal Defts Objection to Tribe's Motion to Unseal Briefs & Exhibits, filed 4/29/94 indicating that copies were mailed to the persons listed on 5/2/94. (sh) [Entry date 05/04/94]
656	5/10/94	MINUTE ORDER: by Judge Lewis T. Babcock—in court hrg on all pending motions set for 10:00 a.m. on 6/17/94. (cc: all counsel); entry date: 5/11/94 (sh) [Entry date 05/11/94]
657	5/11/94	MOTION by plaintiff Southern Ute Indian for leave to file reply to Federal Defts' Objection to Tribe's Motion to Unseal Briefs & Exhibits. (sh) [Entry date 05/12/94]
658	5/12/94	ORDER by Judge Lewis T. Babcock granting Plf Tribe's motion for leave to file reply to Federal Defts' Objection to Tribe's Motion to Unseal Briefs & Exhibits [657-1] —rply to be filed by 5/20/94. (cc: all counsel); entry date: 5/13/94 (sh) [Entry date 05/13/94]

Sub #	Date	Description
659	5/19/94	NOTICE by plaintiff Southern Ute Indian of attorney Scott B. McElroy & Alice Walker's change of address. (sh)
660	5/19/94	REPLY by plaintiff Southern Ute Indian to Defts' response to Plf's motion for order to unseal Tribe's Opening Brief & Reply Brief & the Tribe's Exhibits re Tribe's Cross-Motion for Summ Judgment Against the Class Action Defts & Federal Defts [652-1]. (sh)
661	5/23/94	LETTER to court from counsel John V. Wachtel for defendant Natl Coop Refinery requesting that his name be removed from the mailing list—he states that he withdrew some time ago. (sh)
663	5/24/94	M[illegible]TE ORDER: by Magistrate Judge D[illegible] E. Abram APPROVING [662-1] notice of Pendency of Class Action & of Rights of Class Members. (cc: all counsel); entry date: 6/1/94 (sh) [Entry date 06/01/94]
662	5/31/94	Copy of NOTICE by plaintiff Southern Ute Indian of Pendency of Class Action & of Rights of Class Members. (sh) [Entry date 06/01/94]
664	5/31/94	SPECIAL ORDER OF REFERENCE by Judge Lewis T. Babcock to Magistrate Judge Donald E. Abram referring to Magistrate Judge Donald E. Abram for recommendation on the Plf's motion for order to unseal Tribe's Opening Brief & Reply Brief & the Tribe's Exhibits re Tribe's Cross-Motion for Summ Judgment Against the Class Action Defts & Federal Defts [652-1]. (cc: to counsel) (sh) [Entry date 06/01/94]

Sub #	Date	Description
665	5/31/94	MOTION by plaintiff Southern Ute Indian, defendant Meridian Oil, Inc. and Land Owners Coalseam Committee for Magistrate Judge Abram to review Meridian Settlement Agreement. (sh) [Entry date 06/01/94]
666	6/1/94	Unopposed MOTION by plaintiff Southern Ute Indian, defendant Tiffany Gas Company for Magistrate Judge's review of Tiffany Settlement Agreement. (sh) [Entry date 06/02/94]
667	6/2/94	ORDER by Judge Lewis T. Babcock granting Unopposed Joint motion for Magistrate Judge's review of Tiffany Settlement Agreement. [666-1]. (cc: all counsel); entry date: 6/3/94 (sh) [Entry date 06/03/94]
668	6/6/94	Notice of Error (ERRATA) & Correction by plaintiff Southern Ute Indian to P. 62 of Tribe's motion reply [648-1] (sh)
669	6/6/94	ORDER by Judge Lewis T. Babcock granting the errata notice [668-1], regarding [648-1] Plf's motion reply regarding [586-1] motion for summary judgment before Judge Lewis T. Babcock. (NOTE: The Notice of Error & Correction [668-1] and this Order have been FILED UNDER SEAL and have been PLACED IN THE VAULT.) (cc: all counsel); entry date: 6/6/94 (sh)
670	6/17/94	COURTROOM MINUTES by Judge Lewis T. Babcock taking under advisement on the motion to dismiss action as time barred; for lack of jurisdiction and alternatively for Mineral Owner defs on class action claim and class action defenses before Judge Lewis T. Babcock [627-1], taking

Sub #	Date	Description
		under advisement on the motion for summary judgment before Judge Lewis T. Babcock [586-1], taking under advisement on the motion to dismiss this action as time-barred by 28 U.S.C. Sec. 2401 before Judge Lewis T. Babcock [579-1], taking under advisement on the motion for summary judgment that, inter alia, Plf Tribe does not own the coalbed methane before Judge Lewis T. Babcock [579-2], taking under advisement on the motion for summary judgment on the class action claim and the class action defenses before Judge Lewis T. Babcock [554-1]; entry date: 6/20/94 (pa) [Entry date 06/20/94]
671	6/21/94	CERTIFICATE of mailing on 6/16/94 ntc of pendency class action and of rights of class members to names and addresses being provided by Mobil Oil Corp by plaintiff Southern Ute Indian (lm) [Entry date 06/22/94]
672	6/21/94	NOTICE of pendency of class action and of rights of class members by plaintiff Southern Ute Indian . . . ddl for objs to certification 7/7/94, to be in motion form as set forth in this notice . . . lead csl for dfts David E. Brody—(303) 830-5677 and pla, Thomas H. Shipps (303) 247-1755, Scott B. McElroy—(303) 442-2021 and Michael T. McConnell—(303) 832-1122 Tribe is represented by Thomas Shipps—(303) 247-1755, Scott McElroy—(303) 442-2021 and Michael McConnell—(303) 832-1122 (lm) [Entry date 06/22/94]
673	6/28/94	ORDER by Magistrate Judge Donald E. Abram regarding [652-1] motion for order to unseal Tribe's Opening Brief & Reply

Sub #	Date	Description
		Brief & the Tribe's Exhibits re Tribe's Cross-Motion for Summ Judgment Against the Class Action Defts & Federal Defts—Parties to submit a Motion to Withdraw this motion or a stipulated order. If motion is unresolved, counsel to inform Magistrate's secretary by 7/7/94. (cc: all counsel); entry date: 6/28/94 (sh)
674	6/28/94	ORDER by Magistrate Judge Donald E. Abram regarding [665-1] motion for Magistrate Judge Abram to review Meridian Settlement Agreement. The Agreement approved as to form, subject to approval by Judge Babcock. Recommended that the Meridian Settlement Agreement be approved by the Court. (cc: all counsel); entry date: 6/28/94 (sh)
675	6/28/94	ORDER of the Settlement Master by Magistrate Judge Donald E. Abram regarding [666-1] motion for Magistrate Judge's review of Tiffany Settlement Agreement. This agreement approved as to form & substance, subject to approval by Judge Babcock. Recommended that the Tiffany Settlement Agreement be approved, attached & adopted in the court's Order of Approval & Court order that Tiffany Gas Co. be dismissed with prejudice and direct entry of judgment. (cc: all counsel); entry date: 6/28/94 (sh)
676	6/28/94	ORDER by Judge Lewis T. Babcock regarding [675-1] order of Settlement Master, granting Plfs/Tiffany Gas' motion for Magistrate Judge's review of Tiffany Settlement Agreement [666-1]. Settlement agreement entered between Plf & Deft Tiffany Gas dated 7/30/93 is approved & incorporated as part of this Order. Dis-

Sub #	Date	Description
		missing party Tiffany gas Company with prejudice. Order of dismissal directed to be entered as a final judgment re claims brought by the Tribe against Tiffany Gas. (cc: all counsel) ; entry date: 6/29/94 (sh) [Entry date 06/29/94]
677	7/5/94	STIPULATION by parties, Agreement, & Motion Re Tribe's Motion to Unseal Briefs & Exhibits. (sh) [Entry date 07/07/94]
678	7/11/94	ORDER by Magistrate Judge Donald E. Abram APPROVING [677-1] stipulation, Agreement & Motion re Tribe's Motion to Unseal Briefs & Exhibits—made an order of this court. (cc: all counsel) ; entry date: 7/12/94 (sh) [Entry date 07/12/94]
679	7/12/94	STIPULATION by plaintiff Southern Ute Indian, defendant Meridian Oil, Inc. to dismiss case with prejudice before Judge Lewis T. Babcock, and for order to incorporate Settlement Agreement before Judge Lewis T. Babcock. [Entry date 07/13/94]
680	7/14/94	ORDER by Judge Lewis T. Babcock APPROVING [679-1] stipulated motion to dismiss case with prejudice before Judge Lewis T. Babcock; APPROVING [679-2] stipulated motion for order to incorporate Settlement Agreement before Judge Lewis T. Babcock. Dismissing party Meridian Oil, Inc. with prejudice from this action & Incorporating Settlement Agreement. Until U.S. Dept of Interior issues accommodation approval of the Meridian Settlement Agreement & it is furnished to the court, this order not to be considered a final judgment. Upon issuance of that approval, parties to furnish copy of it to the court. (cc: all counsel) ; entry date: 7/15/94 (sh) [Entry date 07/15/94]

Sub #	Date	Description
681	7/26/94	EXHIBITi—Revised Volume 7 (which is open to the public)—submitted per stipulation [677-1] and Court's order [678-1] of 7/11/94—Re original Volume 7 (which remains under seal) [649-1] to Plfs' motion reply [648-1] to Plfs' motion for summary judgment before Judge Lewis T. Babcock [586-1]. (sh)
682	7/26/94	LETTER to court from plaintiff Southern Ute Indian enclosing the Revised Volume 7 exhibit which will now be open to the public. The original Volume 7 exhibit remains under seal. (sh)
683	9/13/94	MEMORANDUM, OPINION, AND ORDER: by Judge Lewis T. Babcock granting in part & denying in part Deft Amoco's motion for summary judgment on the class action claim and the class action defenses before Judge Lewis T. Babcock [554-1]—granted re question of ownership of CBM gas & judgment to enter in favor of the deft class against Plf Tribe upon its claim for declaration of ownership of CBM gas in the lands at issue. Amoco's motion is denied as moot on the class action defenses based on conclusion that Tribe does not own the CBM gas. Denying the Tribe's motion for summary judgment before Judge Lewis T. Babcock [586-1]. Denying federal defts motion to dismiss this action as time-barred by 28 U.S.C. Sec. 2401 before Judge Lewis T. Babcock [579-1]; granting federal defts' motion for summary judgment that, inter alia, Plf Tribe does not own the coalbed methane [579-2], but only on issue of breach of fiduciary duty for failure to manage the CBM gas. Further scheduling/status conf set for

Sub #	Date	Description
		3:00 p.m. on 11/4/94. At that time Court will consider FRCP 54(b) certification. Ten days prior to the conf parties to submit agreed proposed form of Rule 54(b) order & proposed form of judgment to be certified. Any areas of disagreement in the proposed forms to be specified along with reasons therefor, & supplemented by suggested alternative language. (cc: all counsel); entry date: 9/14/94 (sh) [Entry date 09/14/94]
684	10/6/94	MOTION by defendant McKenzie Methane to withdraw attorney Roger Lichty as atty of record. (sh)
685	10/11/94	ORDER by Judge Lewis T. Babcock granting motion to withdraw attorney Roger Lichty as atty of record for dft McKenzie Methane Corp [684-1] (cc: all counsel); entry date: 10/12/94 (lm) [Entry date 10/12/94]
686	10/21/94	(NOTICE OF SETTLEMENT) Joint Filing by plaintiff Southern Ute Indian, defendant Meridian Oil, Inc. of Fully Executed Settlement Agreement, Together With Accommodation Approval of the U.S. Dept of Interior. (sh) [Entry date 10/25/94]
687	10/24/94	ORDER Directing Entry of Final Judgment as to Deft Meridian Oil Inc. by Judge Lewis T. Babcock APPROVING [686-1] the joint settlement notice and pursuant to [680-2] order of dismissal filed 7/14/94. (cc: all counsel); entry date: 10/27/94 (sh) [Entry date 10/27/94]

Sub #	Date	Description
668	10/25/94	Judgment: by Clerk James R. Manspeaker regarding [687-1] order Directing Entry of Final Judgment; dismissing party Meridian Oil, Inc. with prejudice. (cc: all counsel); entry date: 10/27/94 (sh) [Entry date 10/27/94]
689	10/25/94	MOTION by plaintiff Southern Ute Indian for Entry of Case Management Order No. 3. (NOTE: The original proposed Order attached to this motion has been forwarded to Judge Babcock's chambers for his signature. (sh) [Entry date 10/27/94]
690	10/25/94	Memo BRIEF FILED by plaintiff Southern Ute Indian re entry of judgment and Certification under 28 USC Sec. 1292(b) re Court's Memo Opinion & Order [683-1] and in support of Plf's motion for Entry of Case Management Order No. 3 [689-1]. (sh) [Entry date 10/27/94]
691	10/25/94	STATEMENT by defendant Amoco Production Co—Proposed Judgment & Order of Certification & Brief in Support per directions set forth in Memo Opinion & Order [683-2] of 9/13/94. (NOTE: The proposed Judgment (Exhibit 1) and Order (Exhibit 2) have been submitted to Judge Babcock's chambers for his signature.) (sh) [Entry date 10/27/94]
692	10/25/94	OBJECTIONS by defendant Amoco Production Co to Plf's motion for Entry of Case Management Order No. 3 [689-1]. (sh) [Entry date 10/27/94]
693	10/31/94	NOTICE by defendant Amoco Production Co of Filing of Amended Form of Judgment. (NOTE: The proposed Judgment was submitted to Judge Babcock's cham-

Sub #	Date	Description
		bers for his/the clerk's signature.) (sh) [Entry date 11/01/94]
694	11/1/94	RESPONSE submitted by Land Owners Coalseam Committee to Plf's motion for Entry of Case Management Order No. 3 [689-1]. (sh) [Entry date 11/02/94]
696	11/4/94	COURTROOM MINUTES by Judge Lewis T. Babcock regarding the issue of form of judgment to be certified to the Tenth Circuit Court of Appeals of the [683-2] order entered 9/13/94. Counsel to submit proposed forms of judgment & case management orders next week. Status quo to be maintained re issue of severance tax. Status conf held 11/4/94. entry date: 11/8/94 (sh) [Entry date 11/08/94]
695	11/7/94	TRANSCRIPT of proceedings of Hrg on Summ Judgment Motion held before Judge Babcock on 6/17/94 (169 pages). (sh) [Entry date 11/08/94]
697	11/18/94	NOTICE by defendant McKenzie Methane of filing bankruptcy CASE STAYED stay motion [697-1]. (sh) [Entry date 11/21/94]
698	11/18/94	SUPPLEMENTAL Memo by plaintiff Southern Ute Indian re Proposed Form of Judgment, Proposed Form of Certification, & Case Management in addition to Plfs' brief [690-1] and motion for Entry of Case Management Order No. 3 [689-1]. (NOTE: Exhibits 1-4 to this document have been forwarded to Judge Babcock for his review & signature.) (sh) [Entry date 11/21/94]
699	11/18/94	STATEMENT by defendant Amoco Production Co—Revised Proposed Judgment

Sub #	Date	Description
		& Order of Certification re statement [691-1]. (NOTE: the exhibits attached to this document were submitted to Judge Babcock's chambers for his review & signature.) (sh) [Entry date 11/21/94]
700	11/29/94	ORDER of Certification Pursuant to Rule 54(b) and 28 USC Sec. 1292(b) by Judge Lewis T. Babcock regarding [683-2] Memo Opinion & Order. Findings set forth in this order. Judgment to enter as attached. (cc: all counsel); entry date: 11/30/94 (sh) [Entry date 11/30/94]
701	11/29/94	JUDGMENT: by Chief Deputy Clerk Stephen P. Ehrlich regarding [683-2] Memo Opinion & Order and [700-1] Order of Certificaton. . . Judgment entered for Defts named in First Amended Comp & Deft Class & against Plf on the Class Action claim. Judgment entered on the 1st-5th, 7th, 8th & 10th claims for relief in their entirety. Partial judgment entered for named defts & deft class & against Plf on the 6th claim to the extent that claim is based on a claim that the Tribe owns the coalbed methane. Partial judgment entered for Federal Defts & against Plf on the 11th claim for relief to the extent that claim is based on a claim that the Fed. Defts have breached their fiduciary duty to the Tribe by permitting/acquiescing in the extraction of coalbed methane from the lands within exterior boundaries of the Southern Ute Indian Reservation, where the Tribe owns the coal but not the coalbed methane. (cc: all counsel); entry date: 11/30/94 (sh) [Entry date 11/30/94]

Sub #	Date	Description
702	11/29/94	Case Management ORDER No. 3 (Modified)—by Judge Lewis T. Babcock granting in part Plf's motion for Entry of Case Management Order No. 3 [689-1]. Order includes sub-headings "Notice," "Abeyance of Claims & Defenses," "Tribal Severance Tax," and "Other Orders." (cc: all counsel); entry date: 11/30/94 (sh) [Entry date 11/30/94]
703	12/6/94	TRANSCRIPT of proceedings of Status Hrg held before Judge Babcock on 11/4/94 (48 pages). (sh)
704	12/9/94	NOTICE OF APPEAL by plaintiff Southern Ute Indian re: judgment [701-1] of 11/29/94; Notice of transcript order form due 12/19/94; Notice mailed to all counsel on 12/12/94 (gc) [Entry date 12/12/94]
—	12/9/94	$100.00 fee and $5.00 fee paid. Receipt No. 168661. re: appeal [704-1] (gc) [Entry date 12/12/94]
705	12/9/94	MOTION by plaintiff Southern Ute Indian to amend (alter) judgment Pursuant to FRCP 59(e) [701-1]. (sh) [Entry date 12/14/94]
706	12/12/94	MINUTE ORDER: by Judge Lewis T. Babcock regarding Defts given to 12/28/94 to respond to [705-1] Plf's motion to amend (alter) judgment Pursuant to FRCP 59(e) [701-1]. (cc: all counsel); entry date: 12/14/94 (sh) [Entry date 12/14/94]
707	12/15/94	LETTER to court from counsel William P. Godsman for defendant Hondo Oil & Gas Co, defendant Palo Petroleum, Inc. requesting that his name be removed from the mailing list for these defts have been dismissed. (sh) [Entry date 12/19/94]

Sub #	Date	Description
708	12/20/94	LETTER to court from Jane E. Jacobs, Sec. to G. Donohue Kane, counsel for defendant Tiffany Gas Company requesting that William R. Baesman be removed from com and replaced with Mr. Donohue. (gc)
709	12/23/94	Case No. 94-1579 assigned by the Court of Appeals. [704-1] (gc) [Entry date 12/28/94]
710	12/28/94	NOTICE OF TRANSCRIPT ORDER FORM filed by plaintiff/appellant Southern Ute Indian; (Necessary transcript already on file) re: appeal [704-1] (gc) [Entry date 12/29/94]
712	12/28/94	RESPONSE by defendant Amoco Production Co to motion to amend (alter) judgment Pursuant to FRCP 59(e) [701-1]. [705-1] (gc) [Entry date 12/30/94]
711	12/29/94	LETTER (Re: [704-1) to USCA and all counsel advising that record is now complete . . . tof filed stating necessary transcript is already on file. (gc)
713	12/29/94	NOTICE by defendant Bowen/Edwards Assoc of attorney change of address for Dante L. Zarlengo (gc) [Entry date 12/30/94]
714	1/5/95	MOTION (Request) by plaintiff Southern Ute Indian for leave to file reply in support of mtn to amd jgm (lm) [Entry date 01/06/95]
715	1/5/95	REPLY by plaintiff Southern Ute Indian to response to pla's motion to amend judgment [701-1], [705-1] (lm) [Entry date 01/06/95]
716	1/5/95	MINUTE ORDER: by Judge Lewis T. Babcock granting the Tribe's req for leave

Sub #	Date	Description
		to file reply in support of mtn to amd jgm [714-1] (cc: all counsel); entry date: 1/6/95 (lm) [Entry date 01/06/95]
717	1/6/95	Copy of ORDER from Court of Appeals [704-1] dated 1/4/95. NOA was filed before disposition by dist ct of Motion of Pltf to amend judgment pursuant to FRCP 59(e). NOA is ineffective until date of entry of order disposing of motion. Appeal is ABATED pending notification that dist ct has disposed of pltf's motion. When order enters, pltf' to notify ct and clerk of dist ct to supplement prel record. (gc) [Entry date 01/09/95]
718	1/17/95	ORDER by Judge Lewis T. Babcock denying Tribe's motion to amend judgment [701-], [705-1] (cc: all counsel); entry date: 1/18/95 (lm) [Entry date 01/18/95]
719	1/23/95	AMENDED NOTICE OF APPEAL by plaintiff Southern Ute Indian re: appeal [704-1] in re: judgment [701-1] of 11/29/94 and order [718-1] of 1/17/95. Notice mailed to all counsel on 1/24/95. (gc) [Entry date 01/24/95]
720	1/30/95	LETTER (Re: [704-1]) from USCA to counsel advising that they have rec'd ntc that jgm was entered on 1/17/94 (sic). Notice of appeal has been treated as filed after such entry. (gc)
721	2/2/95	AMENDED MEMORANDUM, OPINION, AND ORDER: Nunc Pro Tunc to 9/13/94 by Judge Lewis T. Babcock re [683-?], [701-1]; . . . . III. B. 2. 1981 Solicitor Opinion. . . . 1. Amoco's mtn for sum jgm is granted on the question of ownership of CBM gas and judgment shall enter in favor

Sub #	Date	Description
		of the dft class against the pla Tribe upon its claim for declaration of ownership of CBM gas in the lands at issue; 2. Amoco's mtn for sum jgm on the class action defenses is denied as moot based on the conclusion that the Tribe does not own the CBM gas; 3. the Tribe's mtn for sum jgm is denied; 4. federal dfts' mtn for sum jgm is granted but only on the issue of breach of fiduciary duty for failure to manage the CBM gas; a further scheduling and status hearing will be held on 11/4/94 at 3:00 pm at which time I will consider FRCP 54(b) certification (cc: all counsel); entry date: 2/3/95 (lm) [Entry date 02/03/95] [Edit date 02/03/95]
722	3/16/95	NOTICE by dfts CO Natl Bk Denver, CO Natl Bk Longmont of attorney change of address (lm)
723	1/23/96	ATTORNEY APPEARANCE for defendant Anthony F. Zarlengo by Dante L. Zarlengo (yk) [Entry date 01/24/96]
724	1/23/96	MOTION by defendant Anthony F. Zarlengo for substitute party Vincent Zarlengo and Richard Zarlengo as co-personal reps of estate of Anthony F. Zarlengo, dcd (yk) [Entry date 01/24/96]
725	1/23/96	Motion by Vincent A. Zarlengo, Richard A. Zarlengo, as co personal representatives of estate of Antyhony Zarlengo to dismiss before Judge Lewis T. Babcock (yk) [Entry date 01/24/96]
726	8/19/96	ORDER by Judge Lewis T. Babcock granting motion for substitute party Vincent Zarlengo and Richard Zarlengo as co-personal reps of estate of Anthony F. Zar-

Sub #	Date	Description
		lengo, dcd [724-1], granting motion to dismiss before Judge Lewis T. Babcock [725-1] terminating party Anthony F. Zarlengo, substituting defendant Vincent A. Zarlengo, Richard A. Zarlengo, dismissing party Richard A. Zarlengo, party Vincent A. Zarlengo. Amoco Production Co. is substituted for Anthony F. Zarlengo as to pltf's claims 1-5, 7, 8 and 10 and as to claims 6 and 9 to the extent that those claims pertain to production of coal bed methane from certain wells. Each party to bear its own costs, expenses and atty fees. (cc: all counsel); entry date: 8/19/96 (gc)
—	8/28/96	MAIL Returned order [726-4] [726-4] addressed to defendant-Richmond Petroleum (dc) [Entry date 09/04/96]
727	8/30/96	NOTICE by defendant JM Huber Corporation of attorney change of address (dc) [Entry date 09/03/96]
728	10/29/96	ATTORNEY APPEARANCE for defendant Emerald San Juan Co by Marc D. Flink (jj) [Entry date 10/30/96]
729	10/29/96	MOTION by plaintiff Southern Ute Indian and Emerrald for magistrate judge to review Emerald settlement agreement (jj) [Entry date 10/30/96]
730	10/30/96	MOTION by defendant Emerald San Juan Co, plaintiff Southern Ute Indian to dismiss Emerald from this case w/prejudice, and for order to incorporate settlement agreement (jj)
731	11/1/96	ORDER OF STLMNT MASTER (MAGIS REC) that stlmnt agreement between So Ute Ind Tribe and Emerald San Juan Co

Sub #	Date	Description
		be approved by Magistrate Judge Donald E. Abram concerning motion to dismiss Emerald from this case w/prejudice [730-1], motion for order to incorporate settlement agreement [730-2] (cc: all counsel); entry date: 11/4/96 (dc) [Entry date 11/04/96]
732	11/1/96	ORDER by Judge Lewis T. Babcock adopting [731-1] - Magistrate's Recommendation granting motion to dismiss unnamed dft Emerald from this case w/prejudice [730-1], granting motion for order to incorporate settlement agreement [730-2]; final jgmnt be entered as to Emerald San Juan Company, L.P., consistent with the terms of this Order; e/pty bear own costs/fees (cc: all counsel); entry date: 11/4/96 (dc) [Entry date 11/04/96]
733	11/7/96	NOTICE by defendant Phillips Petroleum of attorney change of address (jj) [Entry date 11/08/96]
—	12/2/96	MAIL Returned order [732-1] (732-1] addressed to Frederick Douglas, Esq. (dc) [Entry date 12/09/96]
734	12/16/97	NOTICE by defendant Bowen/Edwards Assoc of attorney change of address (dc)
735	1/6/98	ATTORNEY SUBSTITUTION: terminating Michael Remine III (never listed as counsel) and substituting attorney Kevin Kuhn (already appearing) (dc)
764	2/2/98	Certied copy of TRANSCRIPT of proceedings of Settlment with Magis Judge D.E. Abram at 2:38 pm Jan 21 '99 (1-29 pages) Prepared By: AveryWoodsReportingServiceInc. (dc) [Entry date 02/03/99]

Sub #	Date	Description
736	8/7/98	MINUTE ORDER: by Magistrate Judge Donald E. Abram; settlement/status conf set for 11:00 8/20/98 counsel only (cc: all counsel); entry date: 8/10/98 (dc) [Entry date 08/10/98]
737	8/20/98	COURTROOM MINUTES by Magistrate Judge Donald E. Abram; status of case discussed; settlement conf turned into status conference was held 8/20/98; settlement conf set for 10:30 11/19/98; entry date: 8/21/98 Court Reporter: DEA Tapes 98-80,81 (dc) [Entry date 08/21/98]
738	8/21/98	MEMORANDUM by Magistrate Judge Donald E. Abram advising that a combined status/settlement conf held 8/20/98; another settlement conf set for 10:30 11/19/98 (dc)
739	9/3/98	Joint MOTION by plaintiff Southern Ute Indian, defendant Amoco Production Co and LOCC for protective order approving confidentiality agreement (dc) [Entry date 09/04/98]
740	9/8/98	PROTECTIVE ORDER signed 9/8/98 by Magistrate Judge Donald E. Abram: granting stipulated motion for protective order approving confidentiality agreement [739-1]; settlement/status conf set for 10:30 11/19/98 (cc: all counsel) (dc) [Entry date 09/09/98]
741	9/11/98	MANDATE from the Court of Appeals; CA # 94-1579; Dt issued 9/11/98; JUDGMENT dated 7/20/98 reversing jgm of the district court and remanding for further proceedings Statement of Costs. . . . $7,006 taxed in favor of appellant Southern Ute Indian Tribe. [Appeal [704-1] (gc) [Entry date 09/14/98]

Sub #	Date	Description
742	9/24/98	Motion REQUEST by defendant Conoco, Inc. for removal from certificate of service (gc) [Entry date 09/25/98]
743	9/25/98	ORDER by Judge Lewis T. Babcock granting motion of deft Conoco for removal from certificate of service [742-1]. Russel D. Howell and Robert C. Hawley to be removed. (cc: all counsel); entry date: 9/28/98 (dc) [Entry date 10/01/98]
744	9/30/98	MINUTE ORDER : by Magistrate Judge Donald E. Abram at request of counsel to set ; settlement conf is set for 2:00 10/8/98 (cc: all counsel) ; entry date : 10/1/98 (dc) [Entry date 10/01/98]
745	10/8/98	MEMORANDUM by Magistrate Judge Donald E. Abram; settlement conf held 10/09/98]
746	10/16/98	NOTICE by defendant Fuel Resources Dev. defendant Natl Coop Refinery of attorney Charles Carpenter change of address (yk) [Entry date 10/19/98]
747	10/16/98	ATTORNEY APPEARANCE by Charles Carpenter for Petrogulf Corp (yk) [Entry date 10/19/98]
748	11/24/98	MEMORANDUM by Magistrate Judge Donald E. Abram; settlement conf set for 10:00 12/18/98 (yk) [Entry date 11/25/98]
749	11/25/98	NOTIFICATION from Court of Appeals regarding Petition for Writ of Certiorari Filed in US Supreme Court on 11/18/98 Case No. 98-830 (re appeal [704-1] (gc) [Entry date 11/27/98]
750	12/14/98	AMENDMENT TO (SUPPLEMENT) protective order [740-2] as set forth, approv-

Sub #	Date	Description
		ing the attached settlement process agreement (dc) [Entry date 12/15/98]
751	12/17/98	MOTION by defendant Amax Oil & Gas, Inc. for substitute party Universal Resources Corporation (dc) [Entry date 12/18/98]
752	12/17/98	MOTION by defendant Amax Oil & Gas, Inc. to substitute attorney John F Shpeherd and Charles P Henderson of Holland & Hart for Amax (nka Union Pacific Oil & Gas Co) (dc) [Entry date 12/18/98]
753	12/18/98	MINUTE ORDER: by Judge Lewis T. Babcock granting motion to substitute attorney John F Shpeherd and Charles P Henderson of Holland & Hart for Amax (nka Union Pacific Oil & Gas Co) [752-1] attorney Lynn P. Hendrix for Amax Oil & Gas, Inc., attorney Maria J. Williams for Amax Oil & Gas, Inc. and substituting attorney John Frederic Shepherd, Charles Park Henderson (cc: all counsel); entry date: 12/21/98 (dc) [Entry date 12/21/98]
754	12/18/98	ORDER by Judge Lewis T. Babcock granting motion for susbtitute party Universal Resources Corporation [751-1] substituting defendant Universal Resources (cc: all counsel); entry date: 12/21/98 (dc) [Entry date 12/21/98]
755	12/29/98	MINUTE ORDER: by Magistrate Judge Donald E. Abram; settlement conf set for 1:00 1/7/99 between Amoco and So Ute Tribe (cc: all counsel); entry date: 12/29/98 (dc)
756	1/7/99	MEMORANDUM by Magistrate Judge Donald E. Abram; settlement conf held 1/7/99 no settlement (dc)

Sub #	Date	Description
757	1/19/99	SEALED COURTROOM MINUTES by Magistrate Judge Donald E. Abram; ; entry date: 1/19/99 Court Reporter: DEA Civil Tape 99-7 (dc)
758	1/19/99	MINUTE ORDER: by Magistrate Judge Donald E. Abram; settlement conf set for 10:30 1/21/99 (cc: all counsel); entry date: 1/21/99 (dc) [Entry date 01/21/99]
759	1/21/99	SEALED COURTROOM MINUTES by Magistrate Judge Donald E. Abram; settlement conf held 1/21/99; entry date: 1/25/99 Court Reporter: DEA Tape 99-11 - with attachments ** placed in brown envelope and filed in Exh Room in SEALED AREA (dc) [Entry date 01/25/99]
760	1/22/99	SEALED COURTROOM MINUTES by Magistrate Judge Donald E. Abram continuing settlement conference [759-1]; [759-2] minutes; entry date: 1/25/99 Court Reporter; DEA Tape 99-10 ** in brown envelope with doc 759 in Exh Room in SEALED AREA (dc) [Entry date 01/25/99]
761	1/22/99	MEMORANDUM from Magistrate Judge Donald E. Abram advising of partial settlement (dc) [Entry date 01/26/99]
762	2/2/99	Certified copy of TRANSCRIPT of proceedings at 11:50 am of Settlment with Magis Judge D.E. Abram Jan 19'99 (1-12 pages) Prepared By: AveryWoodsReportingServiceInc. (dc) [Entry date 02/03/99]
763	2/2/99	Certified copy of TRANSCRIPT of new afternoon session of proceedings of Settlment with Magis Judge D.E. Abram Jan 21'99 (1-7 pages) Prepared By: Avery

Sub #	Date	Description
		WoodsReportingServiceInc (dc) [Entry date 02/03/99]
765	2/2/99	Certified copy of TRANSCRIPT of proceedings of Settlment with Magis Judge D.E. Abram at 9:30 am Jan 22 '99 (1-6 pages) Prepared By: AveryWoodsReportingServiceInc (dc) [Entry date 02/03/99]

UNITED STATES COURT OF APPEALS
FOR THE TENTH CIRCUIT

Case 94-01579

SOUTHERN UTE INDIAN TRIBE,
Plaintiff-Appellant,
v.
AMOCO PRODUCTION CO., *et al.*,
Defendants-Appellees.

DOCKET ENTRIES

Date	Description
12/22/94	[819357] Civil case docketed. Preliminary record filed. Transcript order form due 1/3/95 for Gwen Daniel pursuant to R.42.1 Docketing statement due 1/3/95 for Southern Ute Indian Notice of appearance due 1/3/95 for Albert E. Zarlengo, for Southern Ute Indian, for Amoco Production, for Hondo Oil & Gas, for Colorado Nat'l Bank, for Colorado Nat'l, for North Central Oil, for Phillips Petroleum, for Amax Oil & Gas, Inc., for Bowen/Edwards Assoc., for Conoco, Inc., for Fuel Resources, for J.M. Huber Corp., for Markwest Energy, for McKenzie Methane, for Meridian Oil, Inc., for Mobil Oil, for National Cooperative, for Northwest Pipeline, for Pablo Operating, for Palo Petroleum,, Inc., for Palo/Eagle Joint, for Richmond Petroleum, for Tiffany Gas Company, for Wililams Production, for Union Texas, for Manuel Lujan, for DOI, for Bureau of Indian, for Bureau of Land, for Minerals Management for Eddie F. Brown, for Delos Cy Jamison (mbm)

Date	Description
12/22/94	[820230] Docketing statement filed by Southern Ute Indian Original and 4 copies c/s: y. (mbm)
12/22/94	[820231] Notice filed that the transcript is already on file in district court. Notice due that record is complete 1/3/95 for Lewis T. Babcock (mbm)
12/22/94	[821085] Notice of appearance filed by Edward J. Shawaker as attorney for Delos Cy Jamison, Eddie F. Brown, Minerals Management, Bureau of Land, Bureau of Indian, DOI, Manuel Lujan. CERT. OF INTERESTED PARTIES (y/n): y Attorneys Martin W. Matzen and Anne S. Almy terminated for Manuel Lujan, DOI, Bureau of Indian, Bureau of Land, Minerals Management, Eddie F. Brown, and Delos Cy Jamison. (afw)
12/22/94	[821087] Notice of appearance filed by James P. Rouse as attorney for Richmond Petroleum. CERT. OF INTERESTED PARTIES (y/n): y (afw)
12/28/94	[821799] Notice of appearance filed by Dante L. Zarlengo as attorney for Bowen/Edwards Assoc.. CERT. OF INTERESTED PARTIES (y/n): y. (pdw)
12/29/94	[820972] Filed notice record is complete 12/29/94. Appellant/Petitioner's brief due 2/7/95 for Southern Ute Indian Appellant/Petitioner's appendix due 2/7/95 for Southern Ute Indian (pdw)
12/30/94	[821165] Notice of appearance filed by Peter A. Bjork, Laura L. Lindley, Gregory R. Danielson as attorney for Mobil Oil, North Central Oil. CERT. OF INTERESTED PARTIES (y/n): y (mbm)
1/3/95	[821432] Notice of appearance filed by Frank Edward Maynes, Thomas H. Shipps as attorney for Southern Ute Indian. CERT. OF INTERESTED PARTIES (y/n): y (fg)
1/3/95	[821592] Notce of appearance filed by Thomas S. Nichols, Anthony J. Shaheen, Charles L. Kaiser as attorney for Amoco Production. CERT. OF

Date	Description
	INTERESTED PARTIES (y/n): n. Attorney Neil Peck for Amoco Production terminated. (mbm)
1/3/95	[821602] Notice of appearance filed by Maria J. Williams, Lynn P. Hendrix as attorney for Amax Oil & Gas, Inc., CERT. OF INTERESTED PARTIES (y/n): y (fg)
1/3/95	[821975] Notce of appearance filed by Daniel F. Warden as attorney for Williams Production, Northwest Pipeline. CERT. OF INTERESTED PARTIES (y/n): y (mbm)
1/4/95	[821775] Order filed by Judge(s) PF abating case [94-1579] Parties served by mail. (mbm)
1/4/95	[821981] Notice of appearance filed by Michael T. McConnell as attorney for Southern Ute Indian. CERT. OF INTERESTED PARTIES (y/n): y (mbm)
1/4/95	[823145] Notice of appearance filed by G. R. Miller as attorney for LOCC. CERT. OF INTERESTED PARTIES (y/n): y (fg)
1/5/95	[822398] Notice of appearance filed by Alice E. Walker, Scott B. McElroy as attorney for Southern Ute Indian. CERT. OF INTERESTED PARTIES (y/n): y (mbm)
1/6/95	[823317] Notice of appearance filed by Lon W. Abadie as attorney for J.M. Huber Corp., CERT. OF INTERESTED PARTIES (y/n): y. Attorney Thomas P. Dugan termnated for J.M. Huber Corp. (pdw)
1/17/95	[825106] Notice of appearance filed by John A. Bryson, Jacques B. Gelin as attorney for DOI. CERT. OF INTERESTED PARTIES (y/n): n (fg)

Date	Description
1/24/95	[827049] Amended notice of appeal filed. (fg)
1/24/95	[827927] Preliminary record on appeal filed. (fg)
1/27/95	[827905] Order filed by Judge(s) PF reactivating case [94-1579] Parties served by mail. (fg)
1/27/95	[829316] Order filed by Judge(s) PF - Appellant's brief due 3/8/95 for Southern Ute Indian Parties served by mail. (fg)
2/4/95	[830370] Order filed by PF notice of appearance form due 2/14/95 for Albert E. Zarlengo, Hondo Oil & Gas, Colorado Nat'l Bank, Colorado Nat'l, Phillips Petroleum, Conoco, Inc., Fuel Resources, J.M. Huber Corp., Markwest Energy, Meridian Oil, Inc., National Cooperative, Northwest Pipeline, Palo Petroleum, Inc., Tiffany Gas Company, Bureau of Indian, Bureau of Land, Minerals Management, Eddie F. Brown, and Delos Cy Jamison. Parties served by mail. (afw)
2/9/95	[831986] Notice of appearance filed by John L. Lawrence, Stan L. Spangler as attorney for Colorado Nat'l, Colorado Nat'l Bank. CERT. OF INTERESTED PARTIES (y/n) : y (fg)
2/13/95	[832914] Notice of appearance filed by Charles Carpenter as attorney for National Cooperative, Fuel Resources. CERT. OF INTERESTED PARTIES (y/n) : y (mbm)
2/13/95	[834033] Notice of appearance filed by Charles Carpenter as attorney for National Cooperative, Fuel Resources. CERT. OF INTERESTED PARTIES (y/m) : y (afw)
2/15/95	[833504] Notice of appearance filed by R. Dennis Ickes, Marilyn P. Fineshriber as attorney for Mobil Oil. CERT. OF INTERESTED PARTIES (y/n) : n. Attorney Larry L. Whyte terminated for Mobil Oil. (pdw)

Date	Description
2/17/95	[834944] Appellant's motion filed by Appellant Southern Ute Indian to extend time to file appellant's brief until 3/27/95 [94-1579]. Original and 3 copies c/s: y (fg)
2/23/95	[834945] Order filed by PF granting Appellant/ Petitioner motion to extend time to file apet brief [834944-1] A/Pet brief due 3/27/95 for Southern Ute Indian Parties served by mail. (fg)
2/28/95	[836513] Order filed by PF notce of appearance form due 3/10/95 for Phillips Petroleum, Conoco, Inc., Markwest Energy Meridian Oil, Inc., Northwest Pipeline, and Palo Petroleum, Inc. Parties served by mail (afw)
3/8/95	[839544] Notice of appearance filed by Teresa Silcox as attorney for Northwest Pipeline. CERT. OF INTERESTED PARTIES (y/n) : y Attorney Patricia E. Schmid terminated for Northwest Pipeline (afw)
3/17/95	[841142] Notice of appearance filed by Willam H. ReMine, David C. Little as attorney for Phillips Petroleum. CERT. OF INTERESTED PARTIES (y/n) : y (fg)
3/17/95	[841866] "Notice of Change of Address" filed by Shaw, Spangler & Roth. c/s: y. (pdw)
3/28/95	[843705] Appellant's brief filed by Southern Ute Indian Original and 7 copies. c/s: y. Served on 3/27/95 Oral argument? y. Appendix filed (11 volumes: Volume #11 is SEALED). Original and 1 appendix copy. Appellee/Respondent's brief due 5/1/95 for LOCC, for Mosbacher U.S.A., for SG Interests I, LTD, for J. Magness, Inc., for Bell South Corp., for Albert E. Zarlengo, for Wells Fargo Bank, for Roderick L. Turner, for First Interstate, for PM Associates, for Jane P. Mosbacher, for Lisa Jean Kaindl], for Larry James Kaindl, for James Eric Kaindl, for Thomas L.

Date	Description
	Johnstone, for Helen Crosland Hendricks, for Liberty Tulsa, for J. L. Goggans, for Mary Jane Enochson, for Henry L. Enochson, for Jack W. Crosland, for Addie G. Crosby, for NCNB TX Nat'l Bank, for Susie M. Ciancio, for Donald C. Ciancio, for Mary Jean Balle, for Jack Balle, for Scott S. Sewell, for Catherine Frances McElvain Harvey, for Amoco Production, for Shirley K. Adams, for Henry Ashworth, for Carla M. Aspaas, for Eric K. Aspass, for Helen Ruth Aspaas, for Laura Belle Aspaas, for Leta M. Adkins, for Rita M. Adkins, for Maxwell C. Anderson, for Earl A. Barker, for Tillie Flaks, for Cassio Frazzini, for Adele Frost, for Robert Galbasin, for Abel S. Gallegos, for H.A. Harmon, for Mabel McElvain, for Thornton H. McElvain, for Dorothy N. McKelvey, for Edwin L. McKelvey, for R. Franklin McKelvey, for W.R. McMahon, for McMurry Oil Company, for W. Clay Meredith, for W.A. Moncrief, for Roy E. Montgomery, for Forrest D. Miller, for Helen L. Miller, for Thomas S. Morrissey, for Fidel Lucero, for Richard C. Malcomb, for Suzanne Heath Manges, for Catherine B. McElvain, for Maurice C. Breen, for Horace F. Buchanan, for Hondo Oil & Gas, for Hyde Oil and Gas, for Charles Kettering, for A.B. Crosby, for Barbara Crosby, for David Crosby, for Colorado Nat'l Bank, for Colorado Nat'l, for Dorothy A. Corgin, for Kelly Cox, for George A. Bugg, for Carbone Investment, for Frederick E. Dickerson, for J.M. Eakes, for John Crow, for Montey Garnand, for Ruby Gibbs Goggins, for Margaret Crow, for Jack Carmack, for Rowland Carmack, for Christine Hamilton, for Hardin Simmons Univ., for Sally M. Etterbeck, for Minnie Flaks, for Robert McFerran Eakes, for Margaret Ellison, for Joseph C. Ciancio, for William Kemp Clark, for Manuel Cruz, for Louis M. Cummins, for Thomas J. Morrissey, for Emil Mosbacher, for John David

Date	Description
	Mosbacher, for R. Bruce Mosbacher, for Myra Theresa Moulds, for North Central Oil, for H.L. Oliver, for Clara Onofrio, for Margaret C. Pargin, for Harold F. Payne, for Neville G. Penrose, for Ben M. Peterson, for Frederick Petrocco, for Phillips Petroleum, for James M. Raymond, for W.E. Rennie, for Thomas C. Romolo, for Benton E. Smullyen, for Clinton I. Smullyen, for William Stirling, for J.L. Tatum, for Anna Carleo Tomeo, for Ernest Tomeo, for Turner Securities, for Richard W. Turner, for George C. Vance, for Anthony H. Veto, for Joseph F. Ware, for Albert E. Zarlengo, for Anthony F. Zarlengo, for Amax Oil & Gas, Inc., for Bowen/Edwards Assoc., for Fuel Resources, J.M. Huber Corp., for McKenzie Methane, for Mobil Oil, for National Cooperative, for Northwest Pipeline, for Palo/Eagle Joint, for Richmond Petroleum, for Williams Production, for Manuel Lujan, for DOI, for Bureau of Indian, for Bureau of Land, for Minerals Management, for Eddie F. Brown, for Delos Cy Jamison (pdw)
4/10/95	[847012] Appellee's motion to extend time to file appellee's brief until 5/19/95 filed by Delos Cy Jamison, Eddie F. Brown, Minerals Management, Bureau of Land, Bureau of Indian, DOI, Manuel Lujan, Scott S. Sewell. Original and 3 copies. c/s: y. (pdw)
4/11/95	[847013] Order filed by PF granting Appellees' motion to extend time to file eres [847012-1] Eres brief due 5/19/95 for DOI, for Bureau of Indian, for of Land, for Minerals Management, for Eddie F. Brown, for Delos Cy Jamison, for Manuel Lujan, for Scott S. Sewell. Parties served by mail. (pdw)
4/14/95	[849312] Joint Motion to Extend time to file appellee's brief until 5/19/95 and appellant's reply

Date	Description
	brief to June 8, 1995 titled "Join Motion for extension of time to Coordinate Briefing schedule" filed by Amoco Production, Southern Ute Indian. Original and 3 copies. c/s: y (fg)
4/19/95	[849314] Order filed by Judge(s) PF granting motion to extend time to file eres brief [849312-1] 5/19/95 for Amoco Production and for Southern Ute to file reply br 6/8/95 Parties served by mail. (fg)
4/27/95	[851663] Joinder filed by Fuel Resources, National Cooperative (to adopt brief of Amoco). Original and 7 copies. cs: y (fg)
5/2/95	[853350] Appellee's motion to adopt "Response Brief and supporting papers that will be filed by Amoco Production" [94-1579] (titled "Response Brief of Richmond Petroleum, Inc.") filed by Richmond Petroleum. Original and 3 copies. c/s: y. (pdw)
5/9/95	[853773] Order filed by PF granting Appellee's (Richmond Petroleum, Inc.) motion to adopt ". . . Response Brief and supporting papers that will be filed by Amoco Production Company. . ." be filed by Amoco Production Company. . ." [853350-1] Parties served by mail. (pdk)
5/11/95	[854555] Appellee's motion to adopt "response brief and supporting papers that will be filed by Amoco Production Company" [94-1579] filed by J.M. Huber Corp. Original and 3 copies. c/s: y. (pdw)
5/16/95	[855415] Order filed by PF - response (CORRECTED Motion to Adopt Eres Brief) due 5/31/95 for J.M. Huber Corp. Parties served by mail. (pdw)
5/16/95	[855463] Joinder titled "Response Brief of Land Owners Coalseam Committee" filed by LOCC. original and 8 copies c/s: y (fg)

Date	Description
5/19/95	[856442] Appellee's deficient brief filed by Amoco Production. Appellee's corrected brief due 5/30/95 for Amoco Production (pdw)
5/22/95	[856696] Appellee's motion to adopt "Response Brief and supporting papers that will be filed by Amoco Production Company" [94-1579] filed by J.M. Huber Corp. Original and 7 copies. c/s y. (pdw)
5/22/95	[856698] Order filed by PF granting Appellee's (J.M. Huber Corporation) motion to adopt "Response Brief and supporting papers that will be filed by Amoco Production Company" [856696-1] Parties served by mail. (pdw)
5/22/95	[856720] Appellee's brief filed by Delos Cy Jamison, Eddie F. Brown, Minerals Management, Bureau of Land, Bureau of Indian, DOI, Manuel Lujan, Scott S. Sewell. Original and 7 copies. c/s: y. Served on 5/19/95 Oral Argument? y (mbm)
5/23/95	[857545] Appellee's brief filed by Amoco Production. Original and 7 copies. c/s: y. Served on 5/23/95. Oral Argument? y. Appendix filed (3 volumes; Volume III is SEALED). Original and 1 appendix copy. (pdw)
5/24/95	[857507] FIRST notice of rules violation for Thomas S. Nichols for Appellee Amoco Production, Anthony J. Shaheen for Appellee Amoco Production, Charles L. Kaiser for Appellee Amoco Production, David E. Brody for Appellee Amoco Production (jt)
5/25/95	[857969] Order filed by PF Appellees' brief due 6/5/95 for Catherine Frances McElvain Harvey, Maxwell C. Anderson, Thornton H. McElvain, Catherine B. McElvain, Hondo Oil & Gas, Colorado Nat'l Bank, Colorado Nat'l, Louis M. Cummins, North Central Oil, Phillips Petroleum, Amax Oil

Date	Description
	& Gas, Inc., Bowen/Edwards Assoc. ,McKenzie Methane, Mobil Oil, Northwest Pipeline, and Williams Production pursuant to FRAP 31(a) and Rule 31.2. Parties served by mail. (afw)
5/30/95	[859025] Appellant's motion filed by Appellant Southern Ute Indian to extend time to file a reply brief until 6/22/95 [94-1579], to file an oversize reply brief 40 pages long [94-1579]. Original and 3 copies c/s: y (mbm)
5/30/95	[859026] Appellee's motion to adopt appellee's brief filed by Amoco [94-1579] filed by Colorado Nat'l, Colorado Nat'l Bank. Original and and 7 copies. c/s: y (mbm)
5/30/95	[859028] Order filed by PF granting Appellee/Respondent CNB (Ft. Collins and Denver) motion to adopt answer brief of Amoco. [859026-1] (mbm)
5/30/95	[859045] Appellee's motion to adopt "Response Brief and supporting papers that will be filed by Bowen/Edwards Assoc. Original and 3 copies. c/s: y. (pdw)
5/31/95	[859253] Appellee's motion to adopt Amoco's brief [94-1579] filed by Mobil Oil. Original and 3 copies. c/s: y (mbm)
5/31/95	[859255] Order filed by judge(s) PF granting Appellee/Respondent Mobile's motion to adopt [859253-1] (mbm)
5/31/95	[859418] Appellee's motion to adopt "Response Brief and supporting papers filed by Amoco Production Company" [94-1579] filed by Williams Production, Northwest Pipeline. Original and 3 copies c/s: y. (pdw)
6/1/95	[859502] Appellant's motion(s) Appellant/Petitioner motion to extend time to file apet reply

Date	Description
	brief, Appellant/Petitioner motion to file an oversize brief submitted to panel. (mbm)
6/1/95	[860546] Appellee's motion to adopt Amoco's answer brief [94-1579] filed by North Central Oil. Original and 7 copies. c/s: y (mbm)
6/2/95	[859762] Order filed by PF granting Appellee's (Northwest Pipeline and Williams Production Company) motion to adopt [859418-1], granting Appellee's (Bowen/Edwards) motion to adopt [859045-1] Parties served by mail. (pdw)
6/2/95	[860036] Joinder of filed by Amax Oil & Gas, Inc., titled "Brief of Union Pacific Oil & Gas Company, Formerly Known as Amax Oil & Gas, Inc." Original and 7 copies. c/s: y (fg)
6/5/95	[860374] Appellee's motion to adopt "Response Brief and supporting papers that will be filed by Amoco Production Company" [94-1579] filed by Louis M. Cummins, Maxwell C. Anderson, LOCC. Original and 3 copies. c/s: y. (pdw)
6/6/95	[860803] Appellee's motion to adopt Amoco's answer brief [94-1579] filed by Phillips Petroleum. Original and 7 copies. c/s: y (mbm)
6/6/95	[860804] Order filed by PF granting Appellee/Respondent motion to adopt [860803-1] (mbm)
6/6/95	[860832] Order filed by PF granting Appellee/Respondent North Central Oil's motion to adopt [860546-1] (mbm)
6/7/95	[860881] Order filed by PF granting Appellees' LOCC, Maxwell Anderson, and Louis Cummins motion to adopt Amoco's brief [860374-1] Parties served by mail. (pdw)
6/7/95	[860892] Order filed by Judge(s) Brorby, Kelly granting Appellant/Petitioner motion to file an oversize brief [859025-2] Parties served by mail. (mbm)

Date	Description
6/22/95	[865435] Appellant's reply brief filed by Southern Ute Indian. Original and 7 copies. c/s: y (mbm)
6/22/95	[865460] Appellant's motion filed by Appellant Southern Ute Indian [94-1579] to file supplemental appendix. Original and 3 copies c/s: y (mbm)
6/22/95	[865463] Supplemental appendix received from Southern Ute Indian, but not filed. Original and 2 copies. c/s: y (mbm)
6/27/95	[865944] Order filed by PF referring Appellant/ Petitioner motion to file appendix [865460-1] REFERRED TO PANEL ON THE MERITS. Parties served by mail. (mbm)
8/24/95	[880138] Hearing set for November 1995 Session, at Denver. (sls)
10/16/95	[892213] Appellee's supplemental authority filed by Amoco Production and submitted to panel. Original and 7 copies. c/s: y (fg)
10/31/95	[895590] Appellant's supplemental authority filed by Southern Ute Indian and submitted to panel. Original and 7 copies. c/s: y (fg)
11/1/95	[895880] Appellant's settlement conference report filed. Original and 3 copies (mbm)
11/1/95	[895882] Report of Settlement Conference submitted to panel. (mbm)
11/13/95	[898572] Letter filed by State of Colorado giving some background to a previous case they were involved in Original. c/s: y (afw)
11/13/95	[898574] Letter filed by State of Colorado giving background in a previous case submitted to panel. (Attorney Tom Shipps objects to said letter and or wants to respond.) (afw)

Date	Description
11/14/95	[898984] Appellee's supplemental authority filed by Minerals Management, Bureau of Land, Bureau of Indian, DOI, Manuel Lujan, Delos Cy Jamison, Eddie F. Brown, Scott S. Sewell and submitted to panel. Original and 7 copies. c/s y. (pdw)
11/15/95	[899423] Case argued and submitted to Judges Seymour, Coffin, McKay. (sis)
12/14/95	[906075] letter from landowner class member filed by (?) Original and 3 copies. cs: y (fg)
12/15/96	[906079] letter from landowner submitted to panel. (fg)
1/25/96	[916292] Motion to substitute parties [94-1579] filed by Amoco Production, Vincent A. Zarlengo, Richard A. Zarlengo. Original and 3 copies. c/s: y. (pdw)
1/25/96	[916294] Motion to dismiss Vincent A. Zarlengo and Richard A. Zarlengo as a parties [94-1579] filed by Vincent A. Zarlengo, Richard A. Zarlengo, Southern Ute Indian. Original and 3 copies. c/s: y. (pdw)
1/25/96	[916350] Notice of appearance filed by Dante L. Zarlengo as attorney for Vincent A. Zarlengo, Richard A. Zarlengo. CERT. OF INTERESTED PARTIES (y/n): y. (pdw)
1/29/96	[916296] Motion to substitute parties, motion to dismiss parties submitted to panel. (pdw)
2/6/96	[918585] Order filed by Judges Seymour, Coffin, McKay granting motion to substitute parties as to Anthony F. Zarlengo [916292-1], granting motion to dismiss parties as in Zarlengo [916294-1] Parties served by mail. (pdw)
9/16/96	[1069874] Notice of appearance filed by Mary V. Laitos as attorney for Independent Petro. CERT. OF INTERESTED PARTIES (y/n): n (hrs)

Date	Description
7/16/97	[1051412] Terminated on the Merits after Oral Hearing; Judgment is Reversed; Written, Signed, Published. Seymour, authoring judge; Coffin; McKay. [94-1579] (afw)
7/16/97	[1119912] Supplemental appendix filed by Appellant Southern Ute Indian. (afw)
7/30/97	[1055440] Bill of costs filed by the appellants Southern Ute Indian Tribe. Original and 3 copies. c/s: y. (hrs)
8/5/97	[1056851] Appellee's response filed by Bureau of Land, Bureau of Indian, DOI Original to the appellant's bill of costs. Original and 3 copies. c/s: y (hrs)
8/14/97	[1059809] Amended Bill of Costs filed by Southern Ute Indian Original and 0 copies. c/s: y. The amended bill of costs was submitted by fax. The original should be stamped as of today. Upon receipt of original, please replace copy in file. (mbm)
8/15/97	[1060484] Appellee's motion to extend time to file petition for rehearing until 9/16/97 [94-1579]. [94-1579] filed by Amoco Production and motion for leave to file a petition of five extra pages. Original and 3 copies. c/s: y (hrs)
8/18/97	[1060492] Appellee's motion()s [1060484-1] Appellee/Respondent motion to extend time to file petition for rehearing, [1060484-2] Appellee/Respondent motion for leave to file a petition of five extra pages submitted to panel. (hrs)
8/18/97	[1060831] Appellee's motion to extend time to file petition for rehearing until 9/16/97 [94-1579] filed by Bureau of Land, Bureau of Indian, DOI. Original and 3 copies. c/s: y (hrs)
8/19/97	[1060819] Bill of costs, the appellee's objection, and the amended bill costs submitted to panel. (hrs)

Date	Description
8/19/97	[1060836] Appellee's motion(s) [1060831-1] extend time to file petition for rehearing submitted to panel. (hrs)
8/19/97	[1061067] Appellee's response filed by Amoco Production Original and 3 copies. c/s: y (hrs)
8/20/97	[1061070] Appellee's response to the appellant's amended bill of costs filed by Amoco Production [1061067-1] submitted to panel. (hrs)
8/25/97	[1062526] Order filed by Judge(s) Seymour, Coffin, McKay granting Appellee/Respondent motion to extend time to file petition for rehearing [1060484-1], granting Appellee/Respondent motion to file a petition of five eztra pages [1060484-2] Petition for rehearing due 9/16/97. Parties served by mail. (hrs)
9/16/97	[1068331] Motion for leave to become amicus [94-1579] filed by Independent Petro, La Plata County. Original and 3 copies. c/s: y (hrs)
9/16/97	[1068333] Motion(s) [10683331-1] motion leave to become amicus filed by Movant Independent Petro, Movant La Plata County submitted to panel. (hrs)
9/16/97	[1068431] Petition for rehearing in banc [94-1579] filed by Amoco Production. Original and 14 copies. c/s: y (hrs)
9/16/97	[1068470] Motion for leave to become amicus [94-1579] filed by Campbell County Wyoming Mineral Owners. Original and 3 copies. c/s: y (hrs)
9/16/97	[1069578] Brief filed by Amicus Curiae CCWMO. Original and 14 copies. c/s: y Oral Argument? n (hrs)
9/16/97	[1069788] Brief filed by Amicus Curiae Independent Petro. Original and 14 copies. c/s: y Oral Argument? n (hrs)

Date	Description
9/16/97	[1069789] Brief filed by Amicus Curiae La Plata County. Original and 14 copies. c/s: n Oral Argument? n (hrs)
9/17/97	[1068432] Document [1068431-1] Petition for rehearing in banc filed by Appellee Amoco Production submitted to panel. (hrs)
9/17/97	[1068570] Motion for leave to become amicus [94-1579] filed by Cattlemen's Assoc. Original and 14 copies. c/s: y (hrs)
9/17/97	[1068572] Motion(s) [1068570-1] motion leave to become amicus filed by Movant Cattlemen's Assoc. submitted to panel. (hrs)
9/17/97	[1069576] Brief filed by Amicus Curiae Cattlemen's Assoc. Original and 14 copies. c/s: y Oral Argument? n (hrs)
9/18/97	[1069176] Motion for leave to become amicus [94-1579] filed by NARO. Original and 3 copies. c/s: y (hrs)
9/18/97	[1069180] Motion [1069176-1] leave to become amicus filed by Movant NARO submitted to panel. (hrs)
9/18/97	[1069790] Brief filed by Amicus Curiae NARO. Original and 14 copies. c/s: y Oral Argument? n (hrs)
9/19/97	[1069537] Order filed by Judge(s) Seymour, Coffin, McKay granting motions by Campbell County Wyoming Mineral Owners, La Plata County, Colorado, Independent Petroleum Association of Mountain States, La Plata County Cattlemen's Association become amicus [1069176-1] [1068470-1] Parties served by mail. The amici briefs will be filed as of the day they were received. (hrs)

Date	Description
9/22/97	[1069793] Amici Brief [1069790-1] filed by The National Association of Royalty Owners, La Plata County, Colorado, La Plata County Cattlemen's Association, Independent Petroleum Association of Mountain States, Campbell County Wyoming Mineral Owners', submitted to panel. (hrs)
9/25/97	[1070869] Order filed by Judge(s) Seymour, Coffin, McKay—response to the appellee's petition for rehearing with suggestion for en banc rehearing due 10/10/97 for Southern Ute Indian. Parties served by mail. (hrs)
10/3/97	[1073232] Appellant's motion filed by Appellant Southern Ute Indian to file a response of twenty pages. [94-1579]. Original and 4 copies c/s: y (hrs)
10/3/97	[1073233] Appellant's motion(s) [1073232-1] Appellant/Petitioner motion for general relief submitted to panel. (hrs)
10/7/97	[1074031] Order filed by Judges Seymour, Coffin, McKay, Porfilio, Anderson, Tacha, Baldock, Brorby, Kelly, Henry, Briscoe, Lucero, Murphy granting Appellant's motion to file a 20 page brief in response to the petition for rehearing. [1073232-1] Parties served by mail. (nak)
10/9/97	[1074934] Appellant's response filed by Southern Ute Indian to court's ordered response. Original and 14 copies. c/s: y. (nak)
10/9/97	[1074936] Appellant's response filed by Southern Ute Indian [1074934-1] to petition for rehearing submitted to panel. (nak)
11/4/97	[1082049] Motion to file brief out of time until 11/4/97 [94-1579] filed by Ignacio School Dist, Bayfield School Dist. Original and 3 copies. c/s: y (fg)

Date	Description
11/4/97	[1082052] Brief filed by Movant Ignacio School Dist, Movant Bayfield School Dist. Original and 7 copies. c/s: y Oral Argument? n (fg)
12/4/97	[1089640] Order filed by Judge(s) Seymour, Porfilio, Anderson, Tacha, Baldock, Brorby, Kelly, Henry, Briscoe, Murphy, McKay and Coffin granting Petition for rehearing in banc [1068431-1] supplemental brief due: 1/23/98 for LOCC, for Mosbacher U.S.A., for SG Interests I, LTD, for J. Magness, Inc., for Bell South Corp., for Albert E. Zarlengo, for Wells Fargo Bank, for Roderick L. Turner, for First Interstate, for PM Associates, for Jane P. Mosbacher, for Lisa Jean Kaindl, for Larry James Kaindl, for James Eric Kaindl, for Thomas L. Johnstone, for Helen Crosland Hendricks, for Liberty Tulsa, for J. L. Goggans, for Mary Jane Enochson, for Henry L. Enochson, for Jack W. Crosland, for Addie G. Crosby, for NCNB TX Nat'l Bank, for Susie M. Ciancio, for Donald C. Ciancio, for Mary Jean Balle, for Jack Balle, for Scott S. Sewell, for Catherine Frances McElvain Harvey, 12/29/97 for Southern Ute Indian, 1/23/98 for Amoco Production, for Shirley K. Adams, for Henry Ashworth, for Carla M. Aspaas, for Eric K. Aspass, for Helen Ruth Aspaas, for Laura Belle Aspaas, for Leta M. Adkins, for Rita M. Adkins, for Maxwell C. Anderson, for Earl A. Barker, for Tillie Flaks, for Cassio Frazzini, for Adele Frost, for Robert Galbasin, for Abel S. Gallegos, for H.A. Harmon, for Mabel McElvain, for Thornton H. McElvain, for Dorothy N. McKelvey, for Edwin L. McKelvey, for R. Franklin McKelvey, for W.R. McMahon, for McMurry Oil Company, for W. Clay Meredith, for W.A. Moncrief, for Roy E. Montgomery, for Forrest D. Miller, for Helen L. Miller, for Thomas S. Morrissey, for Fidel Lucero, for Richard C. Malcomb, for Suzanne Heath Manges, for Catherine B. McElvain, for Maurice C. Breen, for Horace F. Buchanan, for Hondo Oil & Gas, for Hyde Oil and Gas, for Charles Kettering, for A.B. Crosby, for Barbara Crosby, for David Crosby, for Colorado Nat'l Bank, for Colorado Nat'l, for Dorothy A. Corgin, for Kelly Cox, for George A. Bugg, for Carbone Investment, for Frederick E. Dickerson, for J.M. Eakes, for John Crow, for Montey Garnand, for Ruby Gibbs Goggans, for Margaret Crow, for Jack Carmack, for Rowland Carmack, for Christine Hamilton, for Hardin Simmons Univ., for Sally M. Etterbeck, for Minnie Flaks, for Robert McFerran Eakes, for Margaret Ellison, for Joseph C. Ciancio, for William Kemp Clark, for Manuel Cruz, for Louis M. Cummins, for Thomas J. Morrissey, for Emil Mosbacher, for Emil Mosbacher, for John David Mosbacher, for R. Bruce Mosbacher, for Myra Theresa Moulds, for North Central Oil, for H.L. Oliver, for Clara Onofrio, for Margaret C. Pargin, for Harold F. Payne, for Neville G. Penrose, for Ben M. Peterson, for Frederick Petrocco, for Phillips Petroleum, for James M. Raymond, for W.E. Rennie, for Thomas C. Romolo, for Benton E. Smullyen, for Clinton I Smullyen, for William Stirling, for J.L. Tatum, for Anna Carleo Tomeo, for Ernest Tomeo, for Turner Securities, for Richard W. Turner, for George C. Vance, for Anthony H. Veto, for Joseph F. Ware, for Albert E. Zarlengo, for Amax Oil & Gas, Inc., for Bowen/Edwards Assoc., for Fuel Resources, for J.M. Huber Corp., for Mobil Oil, for National Cooperative, for Northwest Pipeline, for Palo/Eagle Joint, for Richmond Petroleum, for Williams Production, for Manuel Lujan, for DOI, for Bureau of Indian, for Bureau of Land, for Minerals Management, for Eddie F. Brown, for Delos Cy. Jamison. "The Court Grants rehearing en banc on the issue of whether 'coal'

Date	Description
	as used in the Coal Land Acts of 1909 and 1910 unambiguously excludes or includes coal bed methane The court does not grant rehearing en banc on the question of whether Chevron deference is owed the 1981 Solicitor's Opinion." Judges Ebel and Lucero are recused. (fg)
12/4/97	[1105249] Order filed by Judges Seymour, McKay, Porfilio, Anderson, Tacha, Baldock, Brorby, Kelly, Henry, Briscoe, and Murphy reopening appeal. [94-1579) (afw)
1/19/98	[1097738] Supplemental brief on Rehearing En Banc filed by Appellant Southern Ute Indian. Original and 15 copies. c/s: y. (nak)
1/9/98	[1097750] Supplemental brief submitted to panel. (nak)
1/21/98	[1100157] Hearing set for March 1998 Session, at Denver, Colorado. (sls)
2/4/98	[1104125] Appellee's motion to extend time to file supplemental brief until 3/6/98 filed by Delos Cy Jamison, Eddie F. Brown, Minerals Management, Bureau of Land, Bureau of Indian, DOI, Manuel Lujan. Original and 3 copies, c/s: y (hrs)
2/4/98	[1104132] Federal appellees' [1104125-1] motion to extend time to file supplemental briefs submitted to panel. (hrs)
2/4/98	[1104289] Supplemental brief filed by Defendant Appellees Land Owners Coalseam Committee and Appellee Louis M. Cummins, Appellee Maxwell C. Anderson. Original and 8 copies. c/s: y. (fg)
2/4/98	[1104326] Supplemental brief submitted to panel. (fg)

Date	Description
2/4/98	[1104335] Motion [94-1579] For Leave To File Amicus Curiae Brief On Rehearing En Banc. filed by Nat'l Association of. Original and 18 copies. cs: y (fg)
2/4/98	[1104336] Amicus Curiae brief on Rehearing En Banc filed by Nat'l Association of. Original and 18 copies. c/s: y. Served on 2/3/98. (fg)
2/4/98	[1104337] Motion(s) motion for leave to file amicus brief on rehearing en banc, along with the supplemental brief filed by National Association of Royalty Owners submitted to panel. (fg)
2/5/98	[1104816] Notice of appearance filed by Ezekiel J. Williams as attorney for Amoco Production. CERT. OF INTERESTED PARTIES (y/n): n. (nak)
2/5/98	[1104850] Motion for leave to file amicus curiae brief on rehearing en banc [94-1579] filed by Independent Petro. Original and 14 copies. c/s: y (hrs)
2/5/98	[1104855] Motion to file amicus brief on rehearing en banc [94-1579] filed by CCWMO. Oriignal and 14 copies. c/s: y (hrs)
2/5/98	[1104928] Appellee's brief on rehearing en banc filed by Amoco Production. Original and 14 copies. c/s: y. Served on 2/5/98 (hrs)
2/5/98	[1108640] Brief on Rehearing En Banc filed by Amicus Curiae CCWMO. Original and 14 copies. c/s: y Oral Argument? n. (fg)
2/6/98	[1104888] Motion [1104850-1] for leave to file amicus brief on rehearing en banc filed by Amicus Curiae CCWMO submitted to panel. (hrs)
2/6/98	[1104929] Appellee's brief on rehearing en banc submitted to panel. (hrs)

Date	Description
2/6/98	[1105138] Motion [1104855-1] for leave to file an amicus curiae brief on rehearing en banc filed by Amicus Curiae Independent Petro submitted to panel. (hrs)
2/6/98	[1105261] Joinder in Defendant Class' Response Brief in the En Banc Proceeding filed by Ignacio School Dist. and Bayfield School Dist. Original and 5 copies. c/s: y (afw)
2/9/98	[1105272] Notice of Joinder in Defendant Class' Response Brief in the En Banc Proceeding filed by Bayfield School and Ignacio School submitted to panel. (afw)
2/9/98	[1105543] Order filed by Judges Seymour, Porfilio, Anderson, Tacha, Baldock, Brorby, Kelly, Henry, Briscoe, Murphy granting Appellees' motion (in part) to extend time to file brief [1104125-1]. Appellees' brief due 2/3/98 for for Manuel Lujan, for DOI, for Bureau of Indian, for Bureau of Land, for Minerals Management, for Eddie F. Brown, for Delos Cy Jamison. Parties served by mail. (sls)
2/9/98	[1105662] Notice of Joinder in Defendant Class' Response Brief in the En Banc Proceeding filed by La Plata County. Original and 14 copies. c/s: y (afw)
2/10/98	[1105663] Notice of Joinder in Defendant Class' Response Brief in the En Banc Proceeding submitted to panel. (afw)
2/11/98	[1106265] Appellant's motion filed by Appellant Southern Ute Indian for leave to file reply brief. Original and 7 copies c/s: y (hrs)
2/11/98	[1106267] Appellant's motion [1106265-1] for leave to file a reply brief submitted to panel. (hrs)
2/12/98	[1106493] Hearing RESET for March 1998 Session, at Denver, Colorado. Case is reset on

Date	Description
	the March 1998 Calendar from Thursday, March 19, 1998, Division 1, 2:00 p.m. to Tuesday, March 17, 1998, Division I, 2:00 p.m. Judge Initials: INB
2/18/98	[1107522] Order filed by PF granting motion by the Independent Petroleum Association of Mountain States [1104850-1]; and granting motion by the National Association of Royalty Owners [1104335-1] for leave to file briefs amici curiae. Parties served by mail. (sls)
2/19/98	[1108054] Order filed by PF granting Appellant/Petitioner motion for leave to file reply [1106265-1]—Due 2/23/98 for Southern Unte Indian. Parties served by mail. (fg)
2/23/98	[1108636] Order filed by PF granting motion of Campbell County Wyoming Mineral Owners for leave to file amicus brief on rehearing. [1104855-1] Parties served by mail. The brief received February 5, 1998 is filed as of that date. (fg)
2/23/98	[1108855] Appellant's supplemental reply brief on rehearing en banc filed by Southern Ute Indian and submitted to panel. Original and 14 copies. c/s: y (afw)
2/23/98	[1108947] Appellee's supplemental brief filed by Delos Cy Jamison, Eddie F. Brown, Minerals Management, Bureau of Land, Bureau of Indian, DOI, Manuel Lujan. Original and 14 copies. c/s: y (fg)
2/23/98	[1108954] Appellee's (Government's Supplemental brief on rehearing submitted to panel. (fg)
3/17/98	[1114522] Case argued and submitted en banc to Judges Seymour, McKay, Porfilio, Anderson, Tacha, Baldock, Kelly, Henry, Briscoe. (sls)

Date	Description
4/15/98	[1122705] Order filed by Judges Seymour, McKay, Porfilio, Anderson, Tacha, Baldock, Kelly, Henry and Briscoe granting Bayfield School District and Ignacio School Districts' motion to file brief out of time. Parties filed a joinder on 2/6/98. No brief is required. [1082049-1] Parties served by mail. (afw)
4/28/98	[1126429] Motion to substitute attorney filed by independent Petro. Original and 3 copies. c/s y. (nak)
4/29/98	[1126567] Order filed by PF granting motion to substitute attorney. [1126429-1] Parties served by mail. (nak)
7/20/98	[1147809] Terminated on the Merits after Oral Hearing; Reversed and Remanded; Written, Signed, Published. Heard en banc including Senior Judge McKay; Seymour, authoring judge. Judges Anderson, Tacha, and Baldock dissenting. Judges Brorby, Ebel, Lucero, and Murphy, recused. [94-1579] (hrs)
8/3/98	[1151826] Bill of Costs filed by Appellate Southern Ute Indian. Original and 3 copies. c/s: y. (pdw)
8/21/98	[1157147] Statement of costs in favor of Appellant filed. (pdw)
9/11/98	[1162354] Mandate issued to district court. Mandate receipt due 10/13/98 (fg)
9/14/98	[1163108] Mandate receipt filed. (fg)
10/19/98	[1172410] Letter from Supreme Court of the United States stating that the application for an extension of time within which to file a petition for writ of certiorari is extended to and including 11/18/98. (afw)

Date	Description
10/19/98	[1172526] notice of extension of time to file a petition for certiorari until 11/18/98 filed by Appellee Amoco Production et. al.,. Original and 0 copies. c/s: y. (fg)
11/25/98	[1182804] Petition for writ of certiorari filed on 11/20/98 Supreme Court Number 98-880. (hrs)

IN THE UNITED STATES DISTRICT COURT
DISTRICT OF COLORADO

Case No. 91-B-2273

SOUTHERN UTE INDIAN TRIBE,
Plaintiff,
v.

AMOCO PRODUCTION COMPANY; SHIRLEY K ADAMS; RITA M. ADKINS; MAXWELL C. ANDERSON; ARCO OIL AND GAS COMPANY; HENRY ASHWORTH; ERIC K. ASPAAS; HELEN RUTH ASPAAS; LAURA BELLE ASPAAS; JACK BALLE; MARY JEAN BALLE; THE HEIRS OF EARL A. BARKER, INCLUDING EARL A. BARKER, JR., MARJORIE L. BLOMSTROM AND LUCILLE A. GRIMM; THE HEIRS OF MAURICE C. BREEN, DECEASED, INCLUDING BERNICE T. BREEN, DONALD H. BREEN, CLARISSA M. SWEENY, AND LUCILLE BREEN, IN HER INDIVIDUAL CAPACITY AND AS GUARDIAN OF RITA K. BREEN; THE HEIRS OF HORACE BUCHANAN, INCLUDING HELEN LEONARDELLI, JAY F. BUCHANAN AND JOEL BUCHANAN; THE HEIRS OF GEORGE A. BUGG; CARBONE INVESTMENT COMPANY; JACK CARMACK; ROWLAND CARMACK; DONALD C. CIANCIO; SUSIE M. CIANCIO; WILLIAM KEMP CLARK; COLORADO NATIONAL BANK OF DENVER AS TRUSTEE OF THE GEORGE VETO TRUST; THE COLORADO NATIONAL BANK OF LONGMONT AS CONSERVATOR OF THE ESTATE OF GLADYS N. FRAZZINI, DECEASED; DOROTHY A. CORGIN; NCNB TEXAS NATIONAL BANK, AS TRUSTEE OF THE KELLY COX TESTAMENTARY TRUST; ADDIE G. CROSBY; JACK W. CROSLAND, JR.; JOHN CROW, JR.; MARGARET CROW; LOUIS M. CUMMINS; THE HEIRS OF FREDERICK E. DICKERSON; J. M EAKES; ROBERT MCFERRAN EAKES; MARGARET ELLISON; HENRY L. ENOCHSON; MARY JANE ENOCHSON; SALLY M. ETTERBECK; THE HEIRS OF TILLIE FLAKS; CARLA M. ASPAAS FOLAND; THE HEIRS OF CASSIO

FRAZZINI; ROBERT A. GALBASIN; ABEL S. GALLEGOS; THE HEIRS OF MONTEY GARNAND; J. L. GOGGANS; RUBY GIBBS GOGGANS; LIBERTY TULSA, AS TRUSTEE OF THE CHRISTINE J. HAMILTON TRUST; HARDIN SIMMONS UNIVERSITY; THE HEIRS OF H. A. HARMAN, DECEASED, INCLUDING NANCY R. HARMAN; CATHERINE FRANCES MCELVAIN HARVEY; HELEN CROSLAND HENDRICKS; HYDE OIL AND GAS CORPORATION; THOMAS L. JOHNSTONE; JAMES ERIC KAINDL; LARRY JAMES KAINDL; LISA JEAN KAINDL; CHARLES KETTERING; FIDEL LUCERO; SUZANNE HEATH MANGES; KATHERINE B. MCELVAIN; THORNTON H. MCELVAIN, JR.; DOROTHY N. MCKELVEY; EDWIN L. MCKELVEY; R. FRANKLIN MCKELVEY; W. R. MCMAHON; MCMURRY OIL COMPANY; THE HEIRS OF W. A. MONCRIEF, DECEASED; THE HEIRS OF FORREST D. MILLER, DECEASED, INCLUDING JAMES M. RAYMOND, CORRINA MILLER GAY AND MAYDELL MILLER MAST; THE HEIRS OF HELEN L. MILLER, DECEASED, INCLUDING DAVID REESE MILLER, GIULA A. MILLER, HOLLY E. MILLER; MICHAEL HOYT MILLER, AND MYRA G. MILLER; THOMAS J. MORRISSEY; THOMAS S. MORRISSEY; MOSBACHER U.S.A., INC.; EMIL MOSBACHER, JR.; THE HEIRS OF JANE P. MOSBACHER. DECEASED; JOHN DAVID MOSBACHER; JOHN EMIL MOSBACHER III; R. BRUCE MOSBACHER; MYRA THERESA MOULDS; NORTH CENTRAL OIL CORORATION; H. L. OLIVER; CLARA ONOFRIO; MARGARET C. PARGIN; HAROLD F. PAYNE, JR.; NEVILLE G. PENROSE; BEN M. PATTERSON, JR.; FREDERICK PETROCCO; PHILLIPS PETROLEUM COMPANY; PM ASSOCIATES, A COLORADO GENERAL PARTNERSHIP; JAMES M. RAYMOND; THE FIRST INTERSTATE BANK OF DENVER, N.A. AS CO-TRUSTEE OF THE ESTATE OF W. E. RENNIE; THE HEIRS OF THOMAS C. ROMOLO, INCLUDING ROSEMARY A. ROMOLO; THE HEIRS OF WILLIAM STIRLING, INCLUDING MAUREEN CUNNINGHAM, LILLIAN MARY DUKES, HELEN MILEY, HARRY A. STIRLING, JOHN H.

STIRLING, THOMAS S. SUTHERLAND, AND THE WALDO E. RENNIE TESTAMENTARY TRUST; THE HEIRS OF J. L. TATUM, DECEASED, INCLUDING THE MARY A. TATUM TRUST, NCNB TEXAS NATIONAL BANK AS AGENT FOR THE TATUM FAMILY AGENCY NO. 4269 01, AND ROBERT S. TATUM; ANNA CARLEO TOMEO; ERNEST TOMEO; TURNER SECURITIES; RICHARD W. TURNER, JR.; RODERICK L. TURNER; WELLS FARGO BANK, AS TRUSTEE OF THE GEORGE C. VANCE TRUST; ANTHONY H. VETO; JOSEPH F. WARE, JR.; ALBERT E. ZARLENGO, JR., AS TRUSTEE FOR THE ALBERT E. ZARLENGO TRUST; ANTHONY F. ZARLENGO; JOHN DOE AND ALL OTHER UNKNOWN PERSONS CLAIMING AN INTEREST IN THE MINERAL ESTATE LOCATED WITHIN THE N/2 OF SECTION 12, T33N, R8W, N.M.P.M., LA PLATA COUNTY, COLORADO; AMAX OIL & GAS, INC.; BELL SOUTH CORPORATION HEALTH CARE TRUST; BOWEN/EDWARDS ASSOCIATES, INC.; CONOCO, INC.; FUEL RESOURCES DEVELOPMENT COMPANY; J. M. HUBER CORPORATION, OIL AND GAS DIVISION; J. MAGNESS, INC.; MARKWEST ENERGY PARTNERS LIMITED; MCKENZIE METHANE CORPORATION; MERIDIAN OIL, INC.; MOBIL OIL CORPORATION; NATIONAL COOPERATIVE REFINERY ASSOCIATION; NORTHWEST PIPELINE CORPORATION; PABLO OPERATING COMPANY; PALO PETROLEUM, INC.; PALO/EAGLE JOINT VENTURES; RICHMOND PETROLEUM, INC.; SG INTERESTS I, LTD.; TIFFANY GAS COMPANY; UNION TEXAS PETROLEUM CORPORATION; WILLIAMS PRODUCTION COMPANY; JOHN DOE OIL COMPANY AND ALL OTHER UNKNOWN PERSONS OR ENTITIES CLAIMING LEASEHOLD WORKING INTERESTS OR OPERATING RIGHTS TO EXPLORE FOR, PRODUCE OR DEVELOP COALBED METHANE OR COAL CONSTITUENTS FROM COAL OR COAL STRATA RESERVED BY THE UNITED STATES IN PATENTS ISSUED UNDER THE ACT OF MARCH 3, 1909, OR THE ACT OF JUNE 22, 1910, FOR LANDS LOCATED WITHIN THE EXTERIOR BOUNDARIES OF THE SOUTHERN UTE INDIAN

RESERVATION, AND WHICH ENTITIES HAVE NOT OBTAINED TRIBAL CONSENT TO AND FEDERAL APPROVAL OF SAID EXPLORATION, PRODUCTION OR DEVELOPMENT ACTIVITIES; MANUEL LUJAN, JR., SECRETARY OF THE UNITED STATES DEPARTMENT OF THE INTERIOR; THE UNITED STATES DEPARTMENT OF THE INTERIOR AND ITS SUBORDINATE AGENCIES; THE BUREAU OF INDIAN AFFAIRS; THE BUREAU OF LAND MANAGEMENT; THE MINERALS MANAGEMENT SERVICE; EDDIE F. BROWN, ASSISTANT SECRETARY OF THE BUREAU OF INDIAN AFFAIRS; DELOS CY JAMISON, DIRECTOR OF THE BUREAU OF LAND MANAGEMENT; SCOTT S. SEWELL, DIRECTOR OF THE MINERALS MANAGEMENT SERVICE; CLASS OF DEFENDANTS SITUATED SIMILARLY TO THOSE NAMED NON-GOVERNMENTAL DEFENDANTS WHO CLAIM OWNERSHIP OF AN INTEREST IN COALBED METHANE AND OTHER COAL CONSTITUENTS OR CLAIM THE RIGHT TO EXPLORE FOR, DEVELOP OR PRODUCE THOSE SUBSTANCES FROM COAL OR COAL STRATA RESERVED BY THE UNITED STATES IN PATENTS ISSUED UNDER THE ACT OF MARCH 3, 1909, OR THE ACT OF JUNE 22, 1910, FOR LANDS LOCATED WITHIN THE EXTERIOR BOUNDARIES OF THE SOUTHERN UTE INDIAN RESERVATION AND WHICH CLASS MEMBERS HAVE NOT OBTAINED TRIBAL CONSENT TO AND FEDERAL APPROVAL OF SAID INTERESTS OR RIGHTS,

Defendants.

[FIRST AMENDED COMPLAINT]

COMES NOW the Plaintiff, Southern Ute Indian Tribe, hereinafter referred to as "the Tribe," by and through the undersigned, and for claims for relief against the Defendants, alleges:

NATURE OF THE COMPLAINT

1. Without being limited by this summary statement, this is a civil action in which the Tribe seeks various forms of relief required to protect the Tribe from the extraction

of coalbed methane, water, carbon dioxide, and other constituents of coal or coal strata reserved by the United States for the perpetual benefit and ownership of the Tribe. Coalbed methane, water, carbon dioxide, and other coal constituents are integral components of the Tribe's coal, portions of which are being extracted from the Tribe's coal, portions of which are being extracted from the Tribe's c oal without the consent of the Tribe. Pursuant to private oil and gas leases issued by owners of the oil and gas estates underlying the same lands on which the Tribe owns the coal, Defendant Amoco Production Company, and the other Defendant Oil Companies have drilled into the Tribe's coal and have extracted substances from the Tribe's coal or coal strata, including coalbed methane and other coal constituents. The production method physically damages the integrity of the Tribe's coal, and in many instances, alters the coalbed methane from an absorbed or sorbed substance to a free gas. The coalbed methane is commercially produced by Amoco Production Company and the other Defendant Oil Companies which assert that the coalbed methane is a gas subject to extraction under private oil and gas leases, notwithstanding the fact that the methane is derived from within coal strata reserved for the benefit of the Tribe and notwithstanding the fact that the methane is an integral component of the Tribe's coal, not generally subject to migration in the absence of the desorption process. The Tribe is receiving no compensation for the commercial extraction of its coal or coal constituents.

The United States of America, trustee for the Tribe, acting by and through the United States Department of the Interior, the Secretary of the Interior and agencies within the Department of the Interior, has acquiesced in the extraction of coalbed methane and other coal constituents from the Tribe's coal in disregard of the fiduciary obligations those entities and officials owe the Tribe in the management of tribal natural resources.

The Tribe seeks a declaration that it owns the beneficial interest in the coal, including all substances located in the coalbeds and coal strata, including all constituent components of the coal, underlying the lands within the reservation where the surface estate was severed from the coal estate by the United States during homesteading undertaken pursuant to the Acts of March 3, 1909, and June 22, 1910; that the extraction of coalbed methane, water, carbon dioxide, and coal constituents from the Tribe's coal without tribal consent constitutes an unlawful trespass against the Tribe; that the United States Department of the Interior, the Secretary of the Interior, and the agencies and officials within the Department of the Interior have a duty to protect the Tribe from the unauthorized extraction of substances found within the coal strata or coalbeds, including constituent components of the Tribe's coal; and that the United States has breached that duty.

Further, the Tribe seeks an order mandating that the Secretary of the Interior take such action necessary to curtail extraction of coalbed methane and other substances located within coal strata or coalbeds, including coal constituents, owned by the Tribe in the absence of tribal consent.

Additionally, the Tribe seeks compensation from Amoco Production Company, the other Defendant Oil Companies, and the oil and gas estate owners for the value of extracted substances wrongfully taken from the Tribe. The Tribe further seeks an order transferring to the Tribe ownership of all equipment and facilities installed by or on behalf of those Defendants on the premises in question utilized in the extraction of coalbed methane, water and other substances located within the Tribe's coal or coal strata insofar as said equipment and facilities are necessary for production of the Tribe's coalbed methane. In those instances permitted by law, including those instances in which the conduct of the Defendant has been occasioned by willful

disregard of the Tribe's ownership interests, the Tribe requests that the facilities be transferred to the Tribe's ownership without any deduction from production revenue or other compensation to the Defendant.

Effective April 26, 1982, the Southern Ute Indian Tribe enacted a severance tax ordinance imposing upon oil and gas operators a tax related to the severance of oil and gas resources from tribal lands. The Tribe's ordinance was amended, effective on April 27, 1990, by enactment of Tribal Ordinance No. 89-01. Defendant Amoco Production Company and other Defendant Oil Companies have not paid and have refused to pay tribal severance taxes upon the severance of coalbed methane from tribal coal in those instances in which the extraction of methane has been conducted or is being conducted pursuant to private oil and gas leases. The Tribe requests that the Court exercise its pendant jurisdiction and direct Defendant Amoco Production Company and the Defendant Oil Companies to pay past and future taxes, together with penalties and interest, authorized by the tribal severance tax ordinances with respect to coalbed methane severance from tribal coal, coalbeds or coal strata.

The magnitude of this case is significant and includes ownership issues affecting approximately 200,000 acres of land, approximately twenty oil and gas companies, several hundred coalbed methane wells, and an estimated 20,000 individuals who own interests in the oil and gas estates underlying lands where the Tribe owns the coal. The only practical mechanism for protecting the Tribe's interests in all the affected lands within the reservation, while at the same time insuring that each affected party's interests are adequately represented, is to request certification of a class of defendants who are situated similarly to the named defendants.

JURISDICTION AND VENUE

2. This Court has jurisdiction to decide this case and to grant the relief requested under 28 USC § 1331, 28 USC § 1361 and 28 USC § 1362.

PARTIES

3. The Southern Ute Indian Tribe is a federally recognized Indian tribe organized pursuant to the Indian Reorganization Act of 1934, Ch. 576, 48 Stat. 984 (codified as amended at 25 USC §§ 461, 462, 463, 464, 465, 466-470, 471-473, 474, 475, 476-478, 479), hereinafter referred to as the "IRA."

4. Amoco Production Company is an oil and gas exploration company licensed to conduct business as a foreign corporation in the state of Colorado. As an oil and gas lessee, Amoco has engaged in the extraction of coalbed methane gas and other coal constituents from tribal coal or coal strata.

5. Amax Oil & Gas, Inc.; Bell South Corporation Health Care Trust; Bowen/Edwards Associates, Inc.; Conoco, Inc.; Fuel Resources Development Company; J. M. Huber Corporation, Oil and Gas Division; J. Magness, Inc.; Markwest Energy Partners Limited; McKenzie Methane Corporation; Meridan Oil, Inc.; Mobil Oil Corporation; National Cooperative Refinery Association; Northwest Pipeline Corporation; Pablo Operating Company; Palo Petroleum, Inc.; Palo/Eagle Joint Ventures; Richmond Petroleum, Inc.; S. G. Interests I, Ltd.; Tiffany Gas Company, Union Texas Petroleum Corporation; and Williams Production Company are, upon information and belief, entities that own leasehold working or reversionary interests thereto or operating rights associated with private oil and gas leases pursuant to which said entities claim the right to develop coalbed methane gas and other coal constituents from tribal coal or coal strata. The entities listed in this Averment are hereinafter referred to as the 'Defendant Oil Companies.'"

6. Manuel Lujan, Jr., the Secretary of the Interior, is charged by law to administer the Indian Mineral Leasing

Act of 1938, Ch. 198, Sec. 1, 52 Stat. 347 (codified as 25 USC § 396a, *et seq.*); the Indian Mineral Development Act of 1982, P.L. 97-382 (codified as 25 U.S.C. § 2101, *et seq.*); and the IRA, all of which require tribal consent to the development of minerals held in trust by the United States of America for the benefit of the Tribe. As a representative of the United States Government, Secretary Lujan is further charged with the highest fiduciary duty of protection to federally recognized Indian tribes and their natural resources.

7. The United States Department of the Interior is the federal executive department responsible for overseeing the development of tribal lands, including minerals, in a manner consistent with the federal trust responsibility to Indian tribes. The duty of overseeing development of minerals owned by the Tribe is divided among the Bureau of Indian Affairs (leasing and land records), the Minerals Management Service (royalty accounting, valuation, and auditing), and the Bureau of Land Management (subsurface management, facility management). All three of the agencies are part of the United States Department of the Interior.

8. Eddie F. Brown, the Assistant Secretary of the Bureau of Indian Affairs; Delos Cy Jamison, Director of the Bureau of Land Management; and Scott S. Sewell, Director of the Minerals Management Service are the supervising officials responsible for carrying out the duties of each of their respective agencies within the Department of the Interior. Hereinafter, the defendants referred to in Averments 6, 7 and 8 are referred to as "the Federal Defendants."

9. All other named Defendants claim an interest in the oil and gas estate underlying lands subsequently described in Averment 14, referred to as the "Subject Lands." These Defendants are hereinafter referred to as "Oil and Gas Lessors." The Oil and Gas Lessors are successors to home-

stead patent recipients who acquired title pursuant to the Coal Lands Act of 1910, Ch. 318, 36 Stat. 583 (codified as 30 USC §§ 83-85), which Act and the patents issued pursuant to it reserved to the United States "all coal in the land so granted, and to it, or persons authorized to buy it, the right to prospect for, mine and remove coal from the same." The Oil and Gas Lessors, or their predecessors in interest, have issued oil and gas leases to Amoco Production Company, its predecessors or successors, pursuant to which extraction of coalbead methane and other coal constituents is taking place.

10. All named Defendants, except for the Federal Defendants, are sued both individually and as representatives of a class of persons who claim an ownership interest in coalbed methane or other coal constituents, or claim the right to explore for, develop or produce those substances from coal or coal strata reserved by the United States in patents issued under the Act of March 3, 1909, Ch. 270, 35 Stat. 844 (codified as 30 U.S.C. § 81) or under the Coal Lands Act of 1910 for lands located within the exterior boundaries of the Southern Ute Indian Reservation and who have not obtained tribal consent to and federal approval of said interests or rights.

11. The above-described class is estimated to exceed 20,000 persons and the members of the class are so numerous that joinder of all members is impracticable; all questions of law and fact related to the fundamental issues in this care are common to the class; the defenses of the representative defendants are typical of the defenses of the class; and the representative defendants will fairly and adequately protect the interests of the class.

12. The prosecution of separate actions against individual members of the class would create a risk of inconsistent or varying adjudications with respect to individual members of the class which would establish incompatible standards of conduct for the Tribe. Additionally, adjudi-

cation of this case as to the representative defendants would as a practical matter be dispositive of the interests of the class defendants not named as defendants, or would substantially impair or impede the ability of those unnamed defendants to protect their interests.

13. The Tribe, in asserting its ownership interests to the coal substances contained in the coal or coal strata at issue, or in refusing to permit extraction of coalbed methane and other coal constituents, has acted or refused to act on grounds generally applicable to the class, thereby making declaratory relief and final injunctive relief appropriate with respect to the class as a whole.

14. The questions of law and fact common to the class predominate over questions affecting only individual members and a defendant class action is superior to other procedures for the fair and efficient adjudication of the controversy.

GENERAL ALLEGATIONS

15. As a consequence of the Tribe's reorganization under the IRA, the United States Congress in 1938 enacted legislation that authorized the restoration of certain previously ceded vacant, undisposed of lands within the boundaries of the reservation back to the Tribe. As of June 28, 1938, Ch. 776, 52 Stat. 1209, 1211. Restoration of undisposed of ceded lands to tribal ownership, including the coal at issue in this case, was accomplished pursuant to the Order of Restoration of September 14, 1938, issued by the Acting Secretary of the Interior under authority conferred by the IRA (25 USC §§ 463,478).

16. The Tribe is the beneficial owner of coal underlying the lands located in the N/2 of Section 12, Township 33 North, Range 8 West, N.M.P.M., La Plata County, Colorado, hereinafter referred to as "Subject Lands."

17. Prior to restoration to the Tribe of the coal underlying the subject lands, the United States of America issued a patent to Douglas H. Campbell on October 11, 1919,

recorded at Book 149, Page 205, of the records of the Clerk and Recorder of La Plata County, Colorado, granting to the patentee a tract of land located in the W/2 NE/4, NE/4 NW/4, and the NW/4 SE/4 of Section 12, Township 33 North, Range 8 West, N.M.P.M., La Plata County, Colorado, hereinafter referred to as the "Campbell Patent."

18. Prior to restoration to the Tribe of the coal underlying the Subject Lands, the United States of America issued a patent to Joe Garnard, on October 6, 1920, recorded at Book 198, Page 253, of the records of the Clerk and Recorder of La Plata County, Colorado, granting to the patentee a tract of land located in the NW/4 NW/4 of Section 12, Township 33 North, Range 8 West, N.M.P.M., La Plata County, Colorado, hereinafter referred to as "the Garnand Patent."

19. Prior to restoration to the Tribe of the coal underlying the Subject Lands, the United States of America issued a patent to Isabilita Martinez, infant child of Bendito Martinez, on March 20, 1923, recorded at Book 304, Page 533, of the records of the Clerk and Recorder of La Plata County, Colorado, granting to the patentee a tract of land located in the S/2 NW/4 of Section 12, Township 33 North, Range 8 West, N.M.P.M., La Plata County, Colorado, hereinafter referred to as the "Martinez Patent." The Campbell Patent, the Garnard Patent, and the Martinez Patent reserved to the United States all coal in the land so granted, together with the right to prospect for, mine and remove coal in accordance with the Coal Lands Act of June 22, 1910, 36 Stat. 583.

20. The Tribe was the beneficiary of the federal reservation of the coal to the United States at the time said patent reservations were made; however, prior to restoration to tribal ownership, said coal could have been leased pursuant to the public mineral laws then in force, provided that the royalty proceeds from such activity were to be saved by the United States for the Tribe's benefit.

21. None of the Defendants or their predecessors in interest obtained an interest in the coal underlying the Subject Lands or other lands similarly situated within the exterior boundaries of the Southern Ute Indian Reservation pursuant to entry under the public mineral laws then in force.

22. Following restoration of the coal to tribal ownership pursuant to the Order of Restoration of September 14, 1938, said coal could no longer be developed under the public land laws, but rather was subject to federal laws governing the leasing of Indian minerals.

23. The reservation of the coal to the United States and the restoration of the reserved coal to the ownership of the Tribe included all substances contained within beds or strata of coal, including all substances that were constitutent, inherent, or integral components of the coal.

24. Under the provisions of federal law, including the Indian Mineral Leasing Act of 1938, 25 USC § 396a *et seq.*, and the Indian Mineral Development Act of 1982, 25 USC §§ 2101, *et seq.*, the consent of the Tribe is required as a condition precedent to conducting exploration for and development of tribal minerals.

25. The Tribe has not consented to the extraction of substances found within its coalbeds or strata or to the extraction of substances that are constituent, inherent, or integral components of the coal underlying the Subject Lands or other lands similarly situated within the exterior boundaries of the Southern Ute Indian Reservation.

26. The Tribe has title that is superior to that of Defendant Amoco Production Company and the Oil and Gas Lessors with respect to the coal underlying the Subject Lands, and the Tribe has title that is superior to that of the Defendant Oil Companies and the Defendant class members with respect to other lands similarly situated within the exterior boundaries of the Southern Ute Indian Reservation, including all substances contained within beds

or strata of that coal, or all substances that are constituent, inherent, or integral components of that coal.

27. Based upon the Averments contained in this Complaint, a case or controversy exists between the parties.

FIRST CLAIM FOR RELIEF

28. Plaintiff hereby incorporates by reference the allegations contained in Averments 1 through 27.

29. The Defendant Oil and Gas Lessors and Defendant Amoco Production Company have refused to and continue to refuse to honor or recognize the Tribe's ownership of all substances located within the coalbeds or strata underlying the Subject Lands, including constituent, inherent or integral components of the coal.

30. In the absence of a judicial determination recognizing that the Tribe owns all substances located within the coalbeds or strata underlying the Subject Lands, the Tribe will suffer immediate and continuing injury.

SECOND CLAIM FOR RELIEF

31. Plaintiff hereby incorporates by reference the allegations contained in Averments 1 through 30.

32. Defendant Oil and Gas Lessors and Defendant Amoco Production Company, through their agents or employees, have trespassed upon tribal land by entering into the coal owned by the Tribe underlying the Subject Lands, and by extracting substances located within the Tribe's coalbeds or strata, including constituent, inherent and integral components of the Tribe's coal, without tribal consent.

33. The trespass of said Defendants has resulted in damage to the Tribe arising from the depletion of substances located within the Tribe's coalbeds or strata, including the depletion of constituent, inherent, and integral components of the Tribe's coal in an amount to be proven at trial.

THIRD CLAIM FOR RELIEF

34. Plaintiff hereby incorporates by reference the allegations contained in Averments 1 through 33.

35. Defendant Amoco Production Company has committed the trespass into the Tribe's coal underlying the Subject Lands and has extracted substances from the Tribe's coalbeds or strata, or has extracted constituent, inherent, and integral components of the Tribe's coal, knowingly, willfully and intentionally, and with no regard for the Tribe's ownership of said substances.

36. Defendant Amoco Production Company's trespass into the Tribe's coal underlying the Subject Lands was commenced after Defendant Amoco Production Company had been made aware of the Tribe's assertions of ownership.

37. As compensation for damages suffered by the Tribe as a result of Defendant Amoco Production Company's intentional and willful trespass, the Tribe is entitled to the value of the substances extracted from the coal without deduction for labor, extraction, lifting, processing, or marketing.

FOURTH CLAIM FOR RELIEF

38. Plaintiff hereby incorporates by reference the allegations contained in Averments 1 through 37.

39. As a result of extraction of substances located within the Tribe's coalbeds or strata underlying the Subject Lands, or of substances that were constituent, inherent, and integral components of that coal, Defendant Amoco Production Company has wrongfully altered said substances from realty to personalty.

40. The substances extracted from the Tribe's coalbeds or strata, including substances that were constituent, inherent, and integral components of the Tribe's coal which were reduced to personal possession by Defendant Amoco

Production Company, were beneficially and constructively owned by the Tribe.

41. Defendant Amoco Production Company has wrongfully and without tribal consent converted the Tribe's coal or coal constituents underlying the Subject Lands by extracting, selling and disposing of same for its own principal benefit.

42. Defendant Amoco Production Company has failed to compensate the Tribe for the value of substances it has wrongfully converted.

43. Said conversion by Defendant Amoco Production Company has resulted in damage to the Tribe in an amount equal to the value received or receivable for the substances wrongfully sold or disposed of by Defendant Amoco Production Company.

FIFTH CLAIM FOR RELIEF

44. Plaintiff hereby incorporates by reference the allegations contained in Averments 1 through 43.

45. Said conversion by Defendant Amoco Production Company has been conducted knowingly, willfully, and intentionally, and in disregard of the Tribe's ownership of all substances located within the Tribe's coalbeds or strata, or in disregard of the Tribe's ownership of constituent, inherent, and integral components of the Tribe's coal.

46. As compensation for damages suffered by the Tribe as a result of Defendant Amoco Production Company's intentional and willful conversion, the Tribe is entitled to additional punitive and exemplary damages to be established at trial.

SIXTH CLAIM FOR RELIEF

47. Plaintiff hereby incorporates by reference the allegations contained in Averments 1 through 46.

48. In entering into the Tribe's coal underlying the Subject Lands, Defendant Amoco Production Company has damaged the integrity of the Tribe's coal.

49. In extracting coalbed methane and other substances located within the Tribe's coalbeds or strata underlying the Subject Lands, or by extracting substances which are constituent, inherent, and integral components of the Tribe's coal, Defendant Amoco Production Company has altered the structure and caused volumetric shrinkage of the Tribe's coal.

50. By entering into the Tribe's coal underlying the Subject Lands, and by placing facilities in the Tribe's coal, Defendant Amoco Production Company has caused damage to the Tribe by increasing the future costs and decreasing the future efficiency of any efforts the Tribe may undertake to mine said coal commercially.

51. The Tribe is entitled to compensation for damages to be proven at trial resulting from the physical incidental damage to the coal which has decreased its mineability, and the Tribe is entitled to compensation for damages resulting from alteration of the structure and the volumetric shrinkage of the Tribe's coal, underlying the Subject Lands.

SEVENTH CLAIM FOR RELIEF

52. Plaintiff hereby incorporates by reference the allegations contained in Averments 1 through 51.

53. In the absence of injunctive relief, Defendant Oil and Gas Lessors and Defendant Amoco Production Company threaten to continue efforts to explore for, to develop and to extract substances from the Tribe's coalbed or strata, or substances that are constituent, inherent, and integral components of the Tribe's coal underlying the Subject Lands, to the irreparable harm and injury of the Tribe.

EIGHTH CLAIM FOR RELIEF

54. Plaintiff hereby incorporates by refererence the allegations contained in Averments 1 through 53.

55. The Tribe is the owner of coal underlying a significant amount of additional land located within the Tribe's reservation, which coal was reserved for the benefit of the Tribe by the United States in patents issued pursuant to the Coal Lands Act of 1909 and the Coal Lands Act of 1910, and which coal was restored to the Tribe pursuant to the Order of Restoration of September 14, 1938. Such coal is hereinafter referred to as "Reserved and Restored Coal."

56. With respect to the Reserved and Restored Coal, Defendant Amoco Production Company, the Defendant class members, and the Defendant Oil Companies have conducted and threatened to continue to conduct coalbed methane exploration, extraction and development activities in a manner similar to and under conditions similar to those described in the foregoing Averments, without tribal consent.

57. With respect to the Reserved and Restored Coal, the activities and planned activities of Defendant Amoco Production Company, the Defendant class members, and the Defendant Oil Companies are unlawful and impermissible, and those activities and planned activities are identical in all fundamental respects with those undertaken by Defendant Amoco Production Company and the Oil and Gas Lessors with respect to the Subject Lands.

58. With respect to the Reserved and Restored Coal, Defendant Amoco Production Company, the Defendant class members, and the Defendant Oil Companies, refuse to recognize the Tribe's paramount right to the coal, coalbed methane or other substances located within the Tribe's coalbeds or strata, or to constituent, inherent and integral components of the Tribe's coal.

59. As a result of activities undertaken by Defendant Amoco Production Company, the Defendant class members, and the Defendant Oil Companies in relation to the Reserved and Restored Coal, the Tribe has suffered injury and damage to be established on a particularized basis with respect to each affected tract in a manner similar to that described in the foregoing Averments.

NINTH CLAIM FOR RELIEF

60. Plaintiff hereby incorporates by reference the allegations contained in Averments 1 through 59.

61. In wrongfully extracting coalbed methane from the Tribe's Reserved and Restored Coal, Defendant Amoco Production Company, the Defendant Oil Companies, and the Defendant class members, have permanently severed and removed from tribal lands located within the Southern Ute Indian Reservation a valuable, non-renewable resource.

62. Defendant Amoco Production Company and the Defendant Oil Companies have failed to pay severance tax to the Tribe as required by Tribal Ordinance No. 89-01, approved by the Secretary of the Interior, on April 27, 1990, or pre-existing tribal severance tax ordinances, for the severance, saving and removal of methane from the Subject Lands and the Reserved and Restored Coal.

63. The Tribe is entitled to payment of all taxes, penalties and interest as provided by Ordinance No. 89-01, or pre-existing tribal severance tax ordinances, attributable to the severance, saving and removal of coalbed methane from tribal lands located within the Southern Ute Indian Reservation where the Tribe owns Reserved and Restored Coal and where Defendant Amoco Production Company or the Defendant Oil Companies have extracted or are extracting coalbed methane from tribal Reserved and Restored Coal.

TENTH CLAIM FOR RELIEF

64. Plaintiff hereby incorporates by reference the allegations contained in Averments 1 through 63.

65. With respect to the Subject Lands or portions of the Reserved and Restored Coal, Defendant Amoco Production Company and some or all of the Defendant Oil Companies have applied for and obtained the permission of officials of the State of Colorado, including, but not limited to, the Colorado Oil and Gas Conservation Commission, to drill into the Tribe's coal.

66. With respect to the Subject Lands or portions of the Reserved and Restored Coal, Defendant Amoco Production Company and some or all of the Defendant Oil Companies have participated in discussions and hearings wtih officials of the State of Colorado in order to obtain approval for the extraction of substances from the Tribe's coalbeds or strata or the extraction of constituent, inherent and integral components of the Tribe's Reserved and Restored Coal.

67. Any permission, grants of authority, or orders issued by officials of the State of Colorado or its political subdivisions facilitating the coalbed methane activities of Defendant Amoco Production Company and the Defendant Oil Companies have been obtained as a result of the joint participation of said Defendants with officials of the State of Colorado under color of state law.

68. In seeking and obtaining the sanction of officials of the State of Colorado to the activities of said Defendants, and in extracting substances from the Tribe's coalbeds or strata or extracting constituent, inherent and integral components of the Tribe's Reserved and Restored Coal or from coalbeds underlying the Subject Lands pursuant to said state action, Defendant Amoco Production Company and the Defendant Oil Companies have deprived the Tribe of rights guaranteed by federal laws, in-

cluding, but not limited to: 25 USC § 177, 25 USC § 396a, 25 USC § 476, and 25 USC § 2102 *et seq.*

69. With respect to the Reserved and Restored Coal and the Subject Lands, Defendant Amoco Production Company and the Defendant Oil Companies have deprived the Tribe of rights secured by federal laws, and said Defendants are liable for redress of injuries resulting to the Tribe in accordance with 42 USC § 1983.

70. In vindication of its rights under 42 USC § 1983, the Tribe is entitled to reimbursement of reasonable attorneys fees and costs in accordance with 42 USC § 1988.

ELEVENTH CLAIM FOR RELIEF

71. Plaintiff hereby incorporates by reference the allegations contained in Averments 1 through 70.

72. The Federal Defendants have served throughout the period of time during which extraction of coalbed methane has taken place on the Southern Ute Indian Reservation and continue to serve as the federal trustee for the Southern Ute Indian Tribe with respect to management of mineral lands owned by the United States for the benefit of the Tribe.

73. The Federal Defendants have been required to act and are required to act in the future as fiduciaries for the Southern Ute Indian Tribe with respect to all Reserved and Restored coal, as well as the Subject Lands.

74. The Federal Defendants have breached their fiduciary duties to the Tribe by permitting or acquiescing in the extraction of substances from the coalbeds or strata, or the extraction of constituent, inherent, and integral components of the Tribe's Reserved and Restored Coal and the Subject Lands without the consent of the Tribe and in violation of various federal laws including, but not limited to, 25 USC § 177, 25 USC § 396a, 25 USC § 2101 *et seq.*, and 25 USC § 476.

75. In violating the federal statutes regulating the methods by which tribal mineral interests may be exploited, the Federal Defendants have deprived and threaten to continue to deprive the Tribe of valuable property rights without due process of law in violation of the United States Constitution, Amendment V.

76. In the absence of mandatory relief provided by this Court, the Federal Defendants will continue to breach their fiduciary, statutory, and constitutional duties owed to the Tribe to the irreparable harm of the Tribe.

WHEREFORE, Plaintiff Southern Ute Indian Tribe prays that the Court enter an Order granting the following:

1. A declaratory judgment determining the following:

(a) The Tribe is the beneficial owner of the coal underlying the Subject Lands.

(b) The Tribe is the beneficial owner of Reserved and Restored Coal located within the boundaries of the Southern Ute Indian Reservation.

(c) Ownership of the coal by the Tribe includes ownership of all substances located within coalbeds or strata reserved and restored to the Tribe, or of all constituent, inherent, and integral components of the coal underlying the Subject Lands and Reserved and Restored Coal.

(d) That mineral development and commercial mining activities related to the coal underlying the Subject Lands and the Reserved and Restored Coal, including the extraction of coalbed methane and water, cannot lawfully take place without the consent of the Tribe.

(e) That the Federal Defendants have a fiduciary trust duty, statutory duties, and constitutional duties that preclude those Federal Defendants from permit-

ting or acquiescing in the development of tribal coal underlying the Subject Lands and the Reserved and Restored Coal in the absence of tribal consent.

(f) That the Federal Defendants have breached their fiduciary trust duty, statutory duties and constitutional duties by acquiescing in the commercial development of tribal coal underlying the Subject Lands and the Reserved and Restored Coal without tribal consent.

(g) That Defendant Amoco Production Company, the Defendant Oil and Gas Lessors, the Defendant Oil Companies and the Defendant class members are subject to the provisions of the tribal severance tax set forth in Tribal Ordinance No. 89-01 and pre-existing tribal severance tax ordinances with respect to the severance, saving and removal of coalbed methane from the Subject Lands and from Reserved and Restored Coal located within the boundaries of the Southern Ute Indian Reservation where those Defendants have engaged or continue to engage in extraction of coalbed methane.

2. An Order quieting title in behalf of the Tribe to the beneficial interest in the coal, to all substances located within coalbeds or strata, and to all substances which are contituent, inherent, and integral components of the coal underlying the Subject Lands.

3. An Order quieting title in behalf of the Tribe to the beneficial interest in all Reserved and Restored Coal, to all substances located within coalbeds or strata of the Reserved and Restored Coal, and to all substances which are constituent, inherent and integral components of the Reserved and Restored Coal.

4. An injunction against the Secretary of the Interior and the other Federal Defendants prohibiting the Federal Defendants from permitting or acquiescing in the extraction of any substances from coal underlying the Subject

Lands and from Reserved and Restored Coal owned by the Tribe within the Southern Ute Indian Reservation in the absence of tribal consent thereto.

5. An injunction against Defendant Amoco Production Company and the Defendant Oil and Gas Lessors prohibiting them from extracting any substances from the coalbeds or strata, including coalbed methane and other coal constituents, underlying the Subject Lands.

6. An injunction prohibiting all Defendants, other than the Federal Defendants, from extracting any coal related substances, including coalbed methane and water, from Reserved and Restored Coal owned by the Tribe within the Southern Ute Indian Reservation in the absence of tribal consent thereto.

7. An award of damages to the Tribe from Defendant Amoco Production Company and from the Defendant Oil and Gas Lessors for the value of all substances wrongfully extracted from the Tribe's coalbeds or strata underlying the Subject Lands without deduction for the costs of labor, extraction, lifting, processing or marketing.

8. An award of damages from Defendant Amoco Production Company and from the Oil and Gas Lessors sufficient to compensate the Tribe for injury to the coal resulting from structural and volumetric alterations in the tribal coals underlying the Subject Lands, and an award of damages from said Defendants to the Tribe for reduction in value of the Tribe's coal for purposes of mining resulting from the conduct of said Defendants with respect to the Subject Lands.

9. An award of damages against Defendant Amoco Production Company and each of the Defendant Oil Companies equal to each such Defendant's share of delinquent taxes, penalties and interest imposed by Tribal Ordinance No. 89-01 and pre-existing tribal severance tax ordinances, related to each such Defendant's extraction of coalbed

methane from coal underlying the Subject Lands and from Reserved and Restored Coal owned by the Tribe.

10. An Order granting to the Tribe ownership of all facilities owned by Defendant Amoco Production Company or by any of the Defendant Oil Companies located on the Subject Lands or on other lands within the Southern Utel Indian Reservation installed for the purpose of extracting coalbed methane and water or the disposal of the same, which facilities, if removed, would interrupt or preclude tribal production of said substances.

11. An award of damages to the Tribe from Defendant Amoco Production Company, the Defendant Oil Companies and the Defendant class members for the value of all substances extracted by each of them from the Tribe's Reserved and Restored Coal, including coalbed methane and other coal constituents, without deduction for the costs of labor, extraction, lifting, processing or marketing where appropriate.

12. An award of damages from Defendant Amoco Production Company, the Defendant Oil Companies, and the Defendant class members sufficient to compensate the Tribe for injury that each of them may have caused to the Tribe's Reserved and Restored Coal resulting from structural and volumetric alterations in the Tribe's Reserved and Restored Coal, and an award of damages from said Defendants to the Tribe for reduction in value of the Tribe's Reserved and Restored Coal for purposes of mining resulting from the conduct of each of said Defendants.

13. An award of damages from Defendant Amoco Production Company and the Defendant Oil Companies for redress of injuries sustained by the Tribe resulting from the actions taken by said Defendants under color of state law.

14. An award of the Plaintiff's costs, attorneys' fees and such other relief as may be reasonable and just.

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STATE OF UTAH)
) ss.
COUNTY OF SUMMIT)

AFFIDAVIT

Matthew J. Mavor, being duly sworn, deposes and says:

1. I am a petroleum engineer with a Bachelor of Science and a Master of Science degree from Stanford University. I have been active for many years in studying recovery of gas from coal seams, developing and applying technology to enhance recovery, and developing models for reservoir analysis of coal seams. I have authored more than 30 papers and reports in this area. My Curriculum Vitae is attached as Exhibit A.

2. I have been engaged by counsel for Amoco Production Company as a consultant in connection with *Southern Ute Indian Tribe v. Amoco Production Company*, Civil Action No. 91-B-2273, United States District Court for the District of Colorado, and have submitted a report and have been deposed in that action. A copy of my report is attached as Exhibit B, and I adopt and make that report a part of this affidavit.

3. Among other things, I have reviewed the portions of the brief submitted by the plaintiff in connection with summary judgment motion, the affidavits of Messrs. Bend, Cooper, Creel, Levine and Marsh furnished with that brief, and the reports previously furnished by them to Amoco's counsel. I am making this affidavit in partial response to some of the matters and issues raised in those materials.

4. The approach to analyzing reservoirs and recovering natural gas from coalbeds is the same as that for nautral gas located in other types of reservoirs, such as sandstone, etc. In broad terms, it consists of locating and determining the extent of gas deposits, drilling into such

deposits, completing the gas well with techniques chosen in light of the bottom hole conditions, transporting the gas to the surface, storing the gas as necessary, and transporting it to the buyer or end user through natural gas pipelines. In every sense of the term, coalbed gas is simply one type of natural gas, recovered through the use of standard techniques, or adaptations of standard techniques, widely used for gas recovery worldwide.

5. Any gas reservoir is analyzed for commercial use by making as informed a prediction as possible of the quantity of gas recoverable for commercial use or sale. This analysis is made by measuring the reservoir's physical characteristics including the nature of the reservoir rock, the porosity, the permeability, the pressure at depth, the presence or absence of water, and the manner of flow. These parameters are then put into appropriate models, the values varied in accordance with the data, and a final determination made as to the volume in place and the recoverable volume of the reservoir and therefore of its value as an economic resource. As more information becomes available—such as the variability of the several parameters over distance and/or time—the model is refined, and predictions modified as needed.

6. Coal reservoirs are no different. To be sure, the numeric input is different from other types of reservoirs because permeability, for example, of coal can be lower or higher than sandstone or limestone. However, all reservoirs differ one from the other, in this sense. The treatment of the reservoir as a *gas* reservoir, is the same for coal as the containing rock as it is for any other rock.

7. The other elements of coalbed gas recovery likewise derive from standard natural gas recovery techniques. (a) the drilling equipment and technique are standard; (b) the completion of a coalbed well draws from the large number of completion techniques developed over the years

to handle the widely varying conditions found underground in non-coal gas reservoirs (for example, a currently popular completion technique, open hole cavitation, is a modern variation of simple, early techniques where a hole was drilled and fractures were induced in a disturbed region around the drill hole to allow more gas to be produced); (c) the transference of water to the surface is done by conventional pumping, with equipment regularly used on liquid producing oil and gas wells of all kinds; and (d) surface equipment, including water-gas separators, storage tanks, compressors and pipelines are all virtually identical to that used with the production of oil, water and natural gas from other sources. Coalbed gas when produced is commingled in pipelines with other gas and in its end use is indistinguishable from natural gas from other sources.

8. These general principles are explained more fully in the report attached as Exhibit B.

9. The test for "volatile matter" carried out on coal samples is one of those used to determine the rank of coal. The test conditions are reflected in ASTM D-3175, a copy of which is attached as Exhibit C. It is not, and cannot be used as, a test for coalbed gas, but one for measuring the combustible by-products of coal when the coal is broken down chemically. The percentage of volatile material in a coal sample is not an indicator of how much coalbed gas that coal in situ would contain.

10. The heating content, measured in BTU's, attributable to coalbed gas in coal in situ is very small; and the heating content attributable to coalbed gas in coal that has been mined and exposed for some time is usually zero or close to zero.

11. The coalbed gas content of coal reservoirs varies widely, in the United States and throughout the world. There are many coal deposits which have virtually no coalbed gas.

Dated this 5 day of November, 1993.

/s/ Matthew J. Mavor
MATTHEW J. MAVOR

[Notary Omitted]

OVERVIEW OF COAL GAS RESERVOIR STRUCTURE, FLUID DYNAMICS, AND COMPLETION TECHNOLOGY

Prepared for:

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January 15, 1993

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Summary

The purpose of this report is to summarize opinions of Mr. Matthew J. Mavor, Manager, Energy Services, Resource Enterprises, Inc., and technical matters relating to these opinions concerning the flow of natural gas through coal natural gas reservoirs, the completion of fluid production wells in coal natural gas reservoirs, and the effect of natural gas production from coal gas reservoirs upon the mineability of the coal solid material. The opinions and supporting material will be presented in three corresponding sections.

A review of the current model that is used to understand fluid flow through a coal gas reservoir will be presented in the first section entitled "Overview of Coal Natural Gas Reservoir Flow Behavior." This section includes material that will show that coal gas reservoirs are similar to other natural gas reservoirs and follow the laws of physics that control movement of fluid through porous media, and that the gas contained therein is not part of the rock (coal or non-coal) structure. In other words, natural gas found in coal gas reservoirs should not be considered differently than natural gas found in other types of gas reservoirs.

The most recent completion practices that are in use to produce gas from vertical production wells completed in coal gas reservoirs will be discussed in the second section entitled "Coal Gas Reservoir Completion Techniques." The subsurface equipment is the same as that used to complete wells in other natural gas reservoirs. The surface equipment is the same as that used to control and measure production from other vapor and liquid producing reservoirs. The most oft used completion procedure known as the cased hole, hydraulic fracture completion is very similar to, if not identical to, the procedure used to complete gas wells in other rock types. The most successful completion procedure used in certain San Juan Basin, Fruitland Formation coal gas production wells is known as the open-hole cavity completion.

The final section of this report entitled "Affect of Gas Production Upon Coal Mining Operations" will discuss the fact that gas must be produced from certain coal seams to be mined to reduce the danger of explosions. Many of these seams could not be mined without gas removal prior to and during mining. Production of gas has a positive and not an adverse affect upon the mineability of the coal.

Overview of Coal Natural Gas Reservoir Flow Behavior

Movement of fluids through underground fluid reservoirs containing hydrocarbons and water is governed by basic principles of physics concerning flow through porous media. The most significant properties of these reservoirs are the ability of the rock to contain fluids and the ability of the rock to allow passage of fluids to producing wells.[1] This section will discuss the flow behavior of underground fluid reservoirs in general and with specific regard to those reservoirs that include the rock type generally known as coal. This section will begin with general definitions followed by a discussion of the storage and fluid flow mechanisms. The final discussion will provide examples of production of fluids from natural gas wells completed in San Juan Basin, Fruitland Formation, coal gas reservoirs.

General Definition of Terms

To clarify the following discussion several definitions are required. Natural gas is defined as hydrocarbons or mixtures of hydrocarbons and non-hydrocarbon compounds that exist as a free vapor phase at temperature and pressure conditions of 80°F and 14.698 psia. The fluid properties of natural gas at reservoir conditions will depend upon the storage mechanism as well as the temperature and/or pressure conditions in the reservoir. Hydrocarbon liquids are hydrocarbons or mixtures of hydrocarbons and non-hydrocarbon compounds that exist in the liquid phase at temperature and pressure conditions of 80°F and 14.698 psia. Water is the pure compound H_2O. Water

may contain various concentrations of dissolved minerals and hydrocarbons that may be in the solid, liquid, or vapor form upon release from the water.

An underground hydrocarbon reservoir is a three dimensional rock system that contains natural gas, hydrocarbon liquids, and water. All hydrocarbon reservoirs contain water to some degree. The proportion of hydrocarbons in the liquid and vapor forms varies from one extreme to the other. The accumulation of hydrocarbons in the reservoir requires that there was a source of organic material in sufficient volume that was exposed to sufficient thermal maturation to generate hydrocarbons (commonly referred to as source rock) and a trap to prevent hydrocarbons from migrating out of the reservoir by the time that the reservoir was discovered. The location of the original organic material may or may not be within the current confines of the reservoir.

All reservoir rocks contain porosity. Porosity is the portion of the reservoir that is comprised of void space that has the ability to store fluids. Porosity is most commonly defined as the ratio of the void volume to the total bulk volume of the reservoir. The size of the pore spaces varies dramatically from micropores that are less than 2 nm (1 nanometer $= 10^{-9}$ meters) that are on the order of the size of gas molecules to centimeters. The distribution of the pore sizes in a reservoir is not uniform but varies dramatically from the very small pores in the coal and clay to natural fractures (discontinuities in the rock fabric) and vugs (voids formed by dissolution of rock material).

Reservoir rock has properties that permit the passage of fluids. Movement of the stored fluids requires that the fluids can flow through the reservoir as the result of pressure or concentration gradients. Flow occurs from regions of greater pressure or concentration to regions of lesser pressure or concentration. A single reservoir system is one that is hydraulically connected. Hydraulically connected means that fluid can be transported from one re-

gion to another within the reservoir or that fluid contained in a region of a reservoir affects the pressure or concentration behavior of the other regions of the reservoir during the producing life of the reservoir. The producing life of the reservoir is measured in tens of years. A single reservoir system can include multiple hydrocarbon pools interconnected through an aquifer (water reservoir).[2] Multiple reservoirs are often found in close vertical and areal proximity.

A reservoir is not a static system over geologic time periods of thousands or millions or years. The properties of the rock and any fluids contained therein are constantly changing over this time scale. The rate of change is sufficiently slow that the system often appears to be static during a time period of 100 years or less.

Hydrocarbon Source Rock and Migration

Natural gas reservoirs associated with coal deposits can consist of rock regions consisting primarily of coal material as well as rock regions consisting of predominately other types of non-organic rock material. The primary source rock for the natural gas and liquid hydrocarbons is generally believed to be organic material that through the process of thermal maturation has been converted to coal, hydrocarbons, and non-hydrocarbon materials.[3] The specific organic material that generated the hydrocarbons stored in a specific reservoir has been altered from the original form and may or may not have been located within the current confines of the specific reservoir of interest. As the organic material is generally believed to have the capacity to generate a significantly greater volume of hydrocarbons than can be retained by the organic material,[4] migration of hydrocarbons away from the original organic material must have occurred. Organic material contained within the non-coal regions would also have generated hydrocarbons. It is rarely possible with current technology to identify the precise origin of natural gas in a coal gas

reservoir. The source could have been within the reservoir of interest, from adjacent reservoirs, or from areas far removed from the current location of the reservoir. Note that the current location of the reservoir may not be the location of the reservoir when the hydrocarbons migrated into the reservoir.

The close proximity of reservoir rock and source rock where it occurs is not unique to coal natural gas reservoirs. The Monterey formation of California is one example of such a system that contains both source and reservoir rock.[5, 6]

Fluid flow through porous media can occur due to pressure and/or concentration differences. This is true during the producing life of a reservoir as well as during the geologic time since the hydrocarbons contained in the reservoir were created. A seal or significant restriction to flow must exist for a reservoir to exist today with hydrocarbon volumes in place that can be recovered in commercial quantities. The seal may not be totally impervious to flow as given sufficient geologic time all contained hydrocarbons may migrate from the current location. The producing life of a reservoir is no more than a "snapshot" in geologic time of the rock that makes up the reservoir and the fluids contained therein.

Consider the following example of the potential for migration. The organic material that was transformed into the coal contained within the Fruitland Formation of the San Juan Basin was deposited approximately 73 million years ago. The generated hydrocarbons have had sufficient time to migrate significant distances during the time since creation. The flow velocity of gas through a very low permeability (10^{-5} md) rock due to a small (0.01 atmosphere per meter) pressure difference is 2 cm per year. This is equivalent to a velocity of 200 km per 10 million years. Diffusion distances can also be significant. A mass transfer rate corresponding to a particle velocity of 0.12 cm/year can be estimated for a coal with a diffusion coeffi-

cient of 10^{-7} cm^2/sec. This is equivalent to a velocity of 12 km per 10 million years.

Reservoir Rock Regions, Subsystems, and Storage of Fluids

As mentioned earlier, natural gas reservoirs associated with coal deposits can consist of rock regions consisting primarily of coal material and stored fluids as well as rock regions consisting of predominately other types of non-organic rock material and stored fluids. A rock region is generally one that is believed to have rock properties that vary in similar manners to changes in pressure or fluid saturations. Absolute permeability, porosity, and pressure can vary within a reservoir rock region. The fluids contained within a reservoir rock region usually have similar compositions and have the same phase behavior as a function of pressure for non-compositional change cases.

The coal rock region is considered to consist of two macroscopically distinct sub-systems. The coal primary subsystem contains the majority of the volume of fluid in place and is considered to be the coal material that contains microscopic porosity in which fluids are contained. The coal secondary subsystem is considered to consist of an interconnected void volume with dimensions that are significantly larger than the microscopic pores contained within the coal material. The secondary system porosity is considered to be composed predominately of natural fractures and connected macropores.[7, 8]

Non-coal rock regions also can be separated into two subsystems. The non-coal primary subsystem contains the bulk of the stored fluid volume. The secondary subsystem consists of interconnected natural fractures and large scale pores.

Fluid is stored in the primary subsystem of the coal and non-coal rock types in the same manner. Both subsystems contain water, natural gas and hydrocarbon liquids stored

in the sorbed state and the free fluid state. Natural gas and hydrocarbon liquids can also be stored in the dissolved state in the primary subsystem. These states will be discussed shortly. The difference between the two rock types is that the sorbed state dominates the majority of the volume of fluid stored in the coal primary subsystem while the free fluid state dominates the majority of the fluid volume stored in the non-coal rock primary subsystem.

Domination of the volume of fluid stored by sorption is not unique to coal gas reservoirs. Natural gas producing Devonian Shale reservoirs also have large volumes of natural gas stored by sorption.[9]

Sorbed gas content estimates have been obtained for coal during Gas Research Institute sponsored studies performed in wells completed in coal gas reservoirs underlying the Southern Ute Indian Reservation. The gas content estimates have ranged from 626.1,[10] 706,[11] to 803 SCF/Ton [12] on a dry, mineral-matter-free coal basis. At in-situ conditions, the gas content estimates ranged from 388,[10] to 554,[11] to 583[12] SCF/Ton (standard cubic feet per ton).

Hydrocarbon gases and liquids can be dissolved in water that is in the free fluid state. Pure water can dissolve approximately 10 SCF/STB (standard cubic feet per stock tank barrel) of methane at conditions of 120°F and 1,422 psia.[13] These conditions are approximately those found in the coal reservoirs underlying the Southern Ute Indian Reservation. The volume of gas sorbed in the coal primary subsystem is much greater than the volume of gas stored in the dissolved state in water in the free fluid state.

Reservoir Fuid Flow

Flow through the reservoir can occur between all rock regions. Molecules will move between regions as the result of a difference in pressure and/or concentration for those in the free fluid state and as the result of a difference in

concentration for those in the sorbed state. Flow behavior is quantified at the macroscopic scale.

Flow of the fluids in the free fluid state is described by Darcy's Law. Darcy's Law states that the magnitude of the fluid mass flow rate is proportional to the surface area through which flow occurs, the permeability, and the pressure gradient.[1] Net molecular movement occurs in the direction of decreasing pressure.

Flow of fluids in the sorbed state is described by Fick's Law[8, 14] that states that the magnitude of the fluid mass transfer rate is proportional to the surface area through which flow occurs, the diffusion coefficient, and the concentration gradient. Net molecular movement occurs in the direction of decreasing concentration.

Both permeability and diffusion coefficient are constants of proportionality and are arbitrarily defined. Permeability is determined for rock samples in the laboratory by measuring fluid mass flow rates as a function of pressure differences across a sample. The primary unit for permeability is the Darcy. Diffusion coefficient is determined by measuring fluid mass flow rates as a function of concentration differences across a sample. The primary unit for the diffusion coefficient is cm^2/sec. Both experiments assume that the contribution to mass transfer from other mechanisms is negligible.

Both permeability and diffusion coefficient appear to be influenced by a variety of parameters. Permeability is a function of the stress applied to the rock, interactions between fluids and the rock material, and the relative proportion of fluids in the vapor and liquid states to name a few parameters. Diffusion coefficient can be a function of temperature, interactions between the fluid molecules and the rock material, and the relative concentration of molecular types to name a few parameters.

Fluids can be produced from a reservoir by reducing the pressure at locations within the reservoir. The petroleum industry drills wells to allow access to the reservoir. The fluid pressure and/or concentration is reduced in the well that in turn creates a pressure and/or concentration gradient within the reservoir.

Natural Fracture Systems

Fluid flow from the coal primary subsystem to production wells requires that a well developed natural fracture system be present in the secondary subsystem. Natural fractures can be observed in coal gas reservoirs from the microscopc to the macroscopic scale. Natural fractures in coal are termed "cleats." The fracture void volume comprises 3% or less of the reservoir bulk volume and stores the majority of the water that is produced from the coal reservoir system. This section provides a brief overview of the geometry of the fracture systems.

A fracture is defined as any natural break or discontinuity in a rock caused by stresses exceeding the strength of that rock, along which there has been virtually imperceptible movement.[18] The physics controlling the creation of natural fractures in coal and other rocks are similar. Coal natural fracture systems are commonly classified into fractures of four types: face cleats, butt cleats, tertiary cleats, and joints. The geometry of cleats is usually specified in terms of frequency (number per centimeter), orientation in the areal sense, dip or the orientaton in a vertical sense, and aperture width.

Face and butt cleats are the most common fractures observed in the Fruitland Formation coal gas reservoirs. Face and butt cleat systems are commonly orthogonal or nearly orthogonal to each other and are essentially perpendicular or near-perpendicular to bedding surfaces. The orientation of the face cleats in the interior of the basin varies but is commonly to the northeast.[12] Shorter length butt cleats terminate in longer length face cleats and are

generally assumed to be of lesser permeability. The dip of the face and butt cleats is nearly vertical in coal beds that are flat lying.

Face and butt cleat fracture description data collected from samples obtained from several Fruitland Formation coal gas wells[16] indicates that the majority of the dip angles are between 70 and 90 degrees. Cleat height ranges from 1 to 60 cm. Cleat frequency in vitrain lithotypes ranges between 1 and 49 cleats per cm. The aperture of the cleats ranges between 0.01 and 0.3 mm with the majority less than 0.05 cm. The aperture widths are quite narrow and can be a significant function of the stress applied to the coal core samples.[17] The porosity of the natural fracture system (fraction of void space in the fracture to the total bulk volume of the reservoir) is on the order of 0.1 to 3%.

As a result of geometric and lateral continuity relationships, there is commonly a significant face and butt cleat permeability anisotropy in coal reservoirs. The ratio between absolute permeability in the fact and butt cleat orientations has been estimated to be 2.8 at the GRI research location known as the COAL Site.[12] The orientation and development of the natural fracture systems strongly influences the directions of fluid flow in the reservoir.

Face and butt cleat frequency is a function of the coal lithotype and the thickness of each of the lithotypes. A coal lithotype is a macroscopically visible band in humic coals[18] that is composed of relatively constant maceral composition. A coal maceral is one of the organic constituents that comprise coal.[18] Macerals in coal are analogous to minerals in non-coal rocks such as sandstone. As an example, a vitrain lithotype is composed predominantly of the maceral vitrinite. Vitrain will appear as a shiny black band in a coal core sample as illustrated in Figure 1. Fracture frequency is typically greatest in the vitrain lithotype. Another very common lithotype is

clarain that is composed of vitrinite and a greater volume of mineral matter than the vitrain lithotype. Clarain appears to be more dull than vitrain in coal core samples. Clarain tends to be less fractured than vitrain. The fracture frequency generally increases as the thickness of the lithotype decreases.[16, 18]

The Fruitland Formation coal zones are characterized by a significant degree of interbedding of coal and non-coal material. An excellent illustration of the degree of similar interbedding from the Raton Basin of Colorado is illustrated in Figure 2. The staff in the figure is five feet long. In a continuous coal zone defined as an interval in which the density log response does not exceed 1.75 g/cc, approximately 30 to 35% of the contained material is in the form of shale layers that separate relatively clean coal layers. Figure 3 illustrates a density log measured in the Southern Ute-Mobil 38-1 well located in Section 38, Township 34 North, Range 10 West of La Plata County, Colorado, on the Southern Ute Indian Reservation.[20] The interbedding of coal and non-coal material reduces the overall thickness of the continuous coal intervals that are in turn comprised of discrete interbedded lithotypes. Fracture frequency has been observed to increase as a function of the decrease in continuous coal zone thickness caused by coal—non coal interbedding. In fact, REI researchers have concluded that a highly interbedded coal gas reservoir will tend to have greater fracture development and as a result greater absolute permeability than a continuous coal interval with less interbedding with non-coal material.[16] As a result of the vertical interbedding, the absolute permeability in the vertical direction can be quite low. The interbedded shale is composed predominately of clay that have very low absolute permeability.

Additional facture systems are present in Fruitland coals that are on the scale of the face and butt cleat system sizes. These fractures are termed tertiary fractures and

are distinguishable by orientations that are different from those of the face and butt cleats. The tertiary fractures commonly terminate in the face or butt cleats suggesting that they were formed later in time. The presence of these cleats is significant as they result in a greater degree of connectivity between the face and butt cleats. The increase in connectivity increases the overall permeability of the natural fracture system.

Larger scale fractures referred to as joints with inter-fracture spacing on the orders of meters are also present in the Fruitland Formation coal. The joints tend to have greater heights and can cut across lithotype and coal-non-coal interbeds. As for the tertiary fractures, the joints increase the overall connectivity of the fracture system resulting in increased fracture system permeability. The larger scale joints also increase the permeability in the vertical direction.

Evidence of the joint systems has been obtained from sonar logs measured in wells that were completed with open-hole techniques that resulted in a cavity in the coal zones. Figure 4 illustrates a cross sectional view of the cavity in the Southern Ute 10-3, 32-10 well located in Section 10, Township 32 North, Range 10 West, La Plata County, Colorado.[21] The large flat surfaces with a length of three to five feet are believed to be the result of failure of the coal along a joint surface.

The complex distribution of fractures results in a highly heterogeneous system. Interestingly, for reservoir engineering purposes, the degree of heterogenalty is such that the flow behavior can act as though the permeability is uniformly distributed in many cases. This observation has been supported by the interpretation of transient pressure tests conducted in the Fruitland Formation coal intervals during GRI sponsored research efforts.[22]

An Example of Simple Coal Gas Reservoir Fluid Flow

Consider a simple coal natural gas reservoir that consists of the primary and secondary subsystems. At virgin conditions the coal gas reservoir contains water in both the primary and secondary subsystems. The majority of the water that can be produced is stored in the secondary subsystem in the free fluid state. The reservoir also contains gas that the majority of which is stored in the sorbed state in the primary subsystem. Gas is also contained in the secondary subsystem in the free fluid state and dissolved in the water.

Imagine that a well is drilled with water. In many cases, the hydrostatic head due to the water in the well would cause the well pressure to be the same as the pressure in the coal gas reservoir at the same depth. There is a natural gas concentration gradient between the rock and the well regardless of the pressure level. Non-water molecules begin to flow by diffusion into the well through both the primary and secondary subsystems. When water is removed from the well, a reduction in the pressure adjacent to the reservoir occurs that in turn causes a pressure gradient through both the primary and secondary subsystems. Flow of water and gas occurs through both subsystems to the well.

In commercially exploitable coal gas reservoirs, the majority of the mass flow rate into the well is due to the pressure gradient through the secondary subsystem. The permeability of the primary subsystem is on the order of micro- and nano-darcies while that of the secondary subsystem is on the order of millidarcies. Secondary subsystem Darcy flow rates are 1,000 to 1,000,000 times greater than primary subsystem Darcy flow rates. In addition, the mass transfer rate at the well due to the pressure gradient far exceeds the mass transfer rate due to the concentration gradient.

The pressure is reduced in the secondary subsystem as fluid is produced. Both pressure and concentration gradients then exist between the primary and secondary sub-

systems. The mass transfer rate into the secondary system is high in commercially exploitable reservoirs due to the large surface area of the primary-secondary subsystem interface.

As production of water continues, the gas saturation in the secondary sub-system increases. The gas saturation is defined as the volume of gas in the secondary subsystem porosity divided by the volume of the secondary subsystem porosity At first all flow into the well is water that is originating from the water filled secondary subsystem that has a porosity of less than 3% of the total reservoir volume. As time continues, the gas flow rate will increase as the primary subsystem delivers gas to the secondary subsystem and the gas saturation in the secondary subsystem increases. The ability of the secondary system to permit the passage of gas is proportional to the gas saturation in the secondary system. This ability is quantified with a relationship to fluid saturations known as relative permeability.[23] As the gas saturation increases, the flow rate of gas increases if all else remains the same. The ability to permit the passage of water decreases as the gas saturation increases. Finally, the water production rate will remain at a relatively low level and gas production rates will begin to decline as the volume of gas stored in the primary subsystem and the pressure of the secondary subsystem is depleted.

The scenario discussed above is the classic description of coal natural gas reservoir behavior. This behavior is generally observed for newly drilled wells located in newly exploited reservoirs away from existing producing wells. The secondary system must be devoid of gas for this scenario to occur. If the secondary system contains significant volumes of gas, the gas rate can be high initially and decline as production continues. An example of this will be described in the next section for wells drilled into developed reservoirs. Coal gas wells have been observed not to exhibit the classic behavior in the high volatile B bituminous area of the Fruitland Formation. The classic

scenario also assumes that the well is produced at a relatively constant bottom-hole pressure. When the bottom-hole production pressure varies, both gas and water production rates will vary dramatically.

One of the common misconceptions concerning gas production from coal reservoirs is that most wells will initially produce all water and the proportion of gas production will increase as a function of time early in the life of the well. The increase in gas production is often referred to as a "negative decline." This phenomena is strictly due to relative permeability changes to gas and water as gas and water saturations change in the secondary subsystem. The "negative decline" term results from a comparison to gas wells completed in reservoirs with immobile water saturations. Water can be immobile if the water saturation is sufficiently low (but never zero) so that the water is trapped in the reservoir by capillary forces. In this case, if a gas well is placed on production while constantly maintaining the bottom-hole producing pressure at the same level, the gas rates will decline as a function of time. The decline is due to the reduction of the average reservoir pressure as the volume of gas in place is depleted. This scenario is possible for gas wells completed in coal gas reservoirs and non-coal gas reservoirs.

The presence or lack of a negative decline period does not prove or disprove that the source of gas produced by a well is from gas sorbed in the coal primary subsystem. Nor does water production or the lack thereof uniquely specify the type of reservoir contributing to the production. Gas reservoirs completed in no-coal rock types always contain water and are located adjacent to rocks that are saturated with water. The water production rate can decrease or increase as a function of time depending upon the initial gas saturation in the reservoir pore space and upon the degree of water influx from surrounding aquifers.

The phenomena of increasing gas production as a function of time is not unique to coal gas reservoirs. Increasing

gas production can also be observed in reservoirs that produce water, liquid hydrocarbons, and natural gas. Reservoir systems of this type are known as "black oil" reservoir systems. In black oil systems, the gas is dissolved in the oil at the time of initial production and not in the free fluid state. The initial production is predominately oil and solution gas with or without water. As the reservoir pressure is reduced, gas is released from the oil and increases the gas saturation in the pore space. As the gas saturation increases, the gas production rate at the well increases with a corresponding decrease in the oil production rate.[24] This phenomena is so analogous to the coal natural gas reservior phenomena that reservoir simulators designed to model the production behavior of black oil reservoirs can be used to accurately model the production behavior of coal natural gas reservoirs.[25]

Examples of Fruitland Formation Coal Gas Wall Productivity

This section will present two actual examples of Fruitland Formation coal gas well production rates that were studied in detail during the course of GRI sponsored research efforts. The first example is from the Southern Ute Tribal I PLA 9 #2 well that was completed with open-hole cavity techniques at the GRI COAL Site.[12] The second well is the Northeast Blanco Unit (NEBU) #403R well located in Section 9 of Township 30 North, Range 7 West of Rio Arriba County, New Mexico.[26] This well was also completed with open hole cavity technology. These type of completions will be discussed in the following section.

The COAL Site included efforts performed on one producing cavity well and two observation wells. The Site was located in Section 17 of Township 32 North, Range 10 West of La Plata County, southwestern Colorado as illustrated in Figure 5. The primary well was a newly drilled open hole cavity well, Southern Ute Tribal I PLA 9 #2 (I #2). This well was logged and tested before

and after installing the cavity completion. A newly drilled pressure observation well (GRI #1) was located 178 feet to the northwest of the I #2 well in the orientation of the butt cleats of the natural fracture system of the coal reservoir. A second newly drilled observation well (GRI #2) was located 1,069 feet to the southwest of the I #2 well in the orientation of the face cleats.

Single well tests of each of the three wells were performed to evaluate the natural fracture system (secondary subsystem) properties prior to cavitation. A pre-cavitation interference test was performed by producting the I #2 well and measuring the pressure response at the GRI #1 and GRI #2 locations. The interference test was repeated after cavitation to evaluate changes that may have occurred due to the completion process and additional production.

The post-cavitation gas and water production rates are illustrated in Figure 6. These rates were measured with a permanently installed production test separator located near the wellhead. Artificial lift was not required to achieve these production rates as the reservoir contained sufficient pressure and permeability to produce naturally. Time zero in this figure is the time at which the cavitation completion operations were initiated. Two production periods are illustrated. The first production periods began at approximately 560 hours and ended at approximately 690 hours. Gas rates increased from 600 MSCF/D (thousand standard cubic feet of gas per day) to a maximum of 1,200 MSCF/D. Water rates decreased from 1,000 STB/D (stock tank barrels per day) to 850 STB/D. The well was shut-in between 695 and 785 hours due to shut-in of the gas sales pipeline. The second production period began 785 hours and continued to 1,485 hours at which time the well was again shut-in. Gas rates increased from 800 MSCF/D at the beginning of the second production period and peaked at 1,600 MSCF/D at approximately 1,000 hours. Following the peak, the gas

rates declined to 1,250 MSCF/D at the end of the production period. Water rates declined from a high of 800 STB/D at the start of the second production period to a relatively stable rate of 450 STB/D at the end of the period.

At first glance, one might be inclined to conclude that the observed increasing gas production rate followed by a decline is due to "classic" coal natural gas reservoir behavior that would be the result of changes in fluid saturations and a decrease in the average reservoir pressure. This is an example where a cursory analysis can lead to considerable errors in the evaluation of producing well performance. Simulation of the well performance with both a coal natural gas reservoir simulator and a dual porosity black oil reservoir simulator was performed to evaluate the data. The observed production rate and bottom-hole pressure data was matched as closely as possible with the output of the numerical models to evaluate the reasons for the productivity variations.

The illustrated match in Figure 8 was obtained with reservoir description based upon the extensive core and well test analyses that were performed. The drainage area in the model was consistent with the 320 acre drainage area spacing of the wells in the surrounding area. The well performance was accurately matched at longer times. It was difficult to match the early production period data or the water production data at the start of the second production period.

The decrease in the gas production rates at longer times was not due to variations in fluid saturation or average reservoir pressure. In fact, the fluid saturations are relatively consistent during these time periods and the reservoir pressure had not been substantially reduced from the original pressure. The decrease in the gas rate was due to increased resistance to flow around the cavity that accounted for a 30% reduction in the near-cavity flow efficiency. The reduction in the near-cavity permeability appears to have been temporary or overcome by other mechanisms because one year after the test was performed the well was producing in excess of 3 MMSCF/D with a flowing bottom-hole pressure of 650 psia.

The second example is the NEBU #430R well that was an offset well to the NEBU #403 well studied extensively during 1988 as part of a GRI research project.[26] This well is completed in the Fruitland Formation with open hole cavity techniques. The well is capable of production without artificial lift due to the reservoir pressure and permeability of the reservoir.

Fgures 7 and 8 illustrate the measured gas and water production rates and those estimated with a coal natural gas reservoir simulator.[27] Note that this well does not follow the classic "negative decline" period model discussed above. Gas rates are continuously declining for this well with the exception in the large increase that occurred at approximately 70 hours. The increase in gas and water production rates that occurred at this time was due to a decrease in the flowing bottom-hole pressure from 1,250 to 950 psia. The drop in bottom-hole pressure was due to a decrease in the surface pipeline pressure. This behavior resulted as the gas saturation in the secondary subsystem was approximately 35% of the secondary subsystem total volume at the time that the well was placed upon production. The Northeast Blanco Unit Area is offset by numerous Meridian Oil Company coal gas reservoir wells that had been on production for several years prior to NEBU production.

There is no characteristic behavior in the production performance of this well that immediately suggests that the source of gas is from a coal natural gas reservoir. This is true of the production rates as well as the composition of the produced fluids.

One aspect of the reservoir simulation that is interesting for both of these examples is the lack of the need to account for the diffusion of gas through the coal matrix.

Diffusion of gas is so rapid in the high volatile A bituminous and greater rank area of the basin that the computed production performance is independent of the coal primary subsystem diffusion coefficient that is used in the model. The black oil model used to match the production behavior of the I #2 well assumed that the diffusion coefficient was infinite. this assumption resulted in the a computed average gas content of the coal primary subsystem that was always equal to the sorbed gas storage capacity at the secondary subsystem average pressure. Variations in the diffusion coefficient did not affect the computed behavior for the NEBU #403R well either.

Coal Gas Reservoir Completion Techniques

The preceding discussion has ignored the effect of the well upon productivity of the reservoir. Accurate prediction of productivity requires that the effect of the well-reservoir boundary be properly quantifled. Drilling and completing a well significantly alters the properties of both the primary and secondary subsystems adjacent to the well. Solid and liquid material from the drilling fluid are forced into the gas reservoir. The solid and fluid material interact with the reservoir fluids and rock. These interactions are almost always detrimental to the ability of the reservoir to produce fluids. Drilling mud commonly reduce the deliverability of the coal reservoir to less than half the virgin rock potential within hours of drilling.[12] Completion techniques are designed to overcome the effects of drilling and to increase the connectivity of the well to the reservoir rock through which flow occurs.

Natural gas producing wells completed in coal gas reservoirs have utilized a a variety of completion techniques including the following. With the exception of the cavitated open-hole techniques, all of the completion techniques were developed for non-coal gas reservoirs and are applied to coal gas reservoirs with very little modification from the originally developed technology.

Table 1. Completion Techniques

Barefoot Open-Hole
Under Reamed Open-Hole
Hydraulically Fractured Open-Hole
Cased, Slotted, No Stimulation
Cased, Perforated, No Stimulation
Cased, Perforated, Hydraulic Fracture Stimulation
Cavitated Open-Hole

The most widely used technique is the cased, perforated, fractured technology. In the San Juan Basin, the open-hole cavity completion is also extensively utilized and accounts for approximately 860 of 2,200 wells. This section briefly discusses these techniques.

Cased Hole, Hydraulic Fracture Completions

Numerous types of hydraulic fracture stimulation treatments have been applied in coal natural gas reservoirs. The following injection and proppant carrying fluids have been used. These fluids were developed for non-coal reservoir applications and have been applied to coal gas reservoirs with only minor modifications.

Table 2. Stimulation Fluids

Water
Hydrochloric Acid
Hydrofluoric/Hydrochloric Acid
Nitrogen Foam
Carbon Dioxide Foam
Nitrogen, Carbon Dioxide Foam
Linear Gelled Water
Cross-linked Gelled Water

Hydraulic fracturing technology has become a subject of much debate among coal gas reservoir operators. The techniques that have been in vogue have come full circle starting with water injection without proppant in the early days, progressing to linear gels, foamed water, cross-linked gel systems, nitrogen and carbon dioxide foamed systems,

and recently, back to formation water with low and no proppant concentrations.

Originally, open-hole completions (especially in the Warrior Basin) were stimulated by injection of water [28] without proppant to artificially fracture the near-well reduced permeability zone and to provide flow paths through the reduced permeability zone. These stimulations were reported to be successful.

Taurus Exploration, Inc., began using foamed water and linear gel systems in the Oak Grove Field of the Warrior Basin to stimulate the Mary Lee/Blue Creek coal seams in 1986.[29] Total proppant load was 40,000 pounds of 10/20 or 20/40 mesh sand for each type of treatment. Treating pressure gradients ranged from 0.77 to 1.21 psi/ft. Based upon this experience, high volume water treatments with moderate proppant levels (2 to 4 pounds of proppant per gallon of water) became the standard.

Use of cross-linked gel systems was found to be very successful at the GRI funded Rock Creek research site.[30] Proppant loads were increased to 10 pounds per gallon. Fluids of this type were used by Amoco Production Co. in the Cedar Hill Field of the San Juan Basin, New Mexico, as well. Other San Juan Basin operators shortly followed suit. A typical San Juan Basin stimulation used was based upon designs used in sandstone reservoirs and was similar to the following.

Table 3. Typical San Juan Basin Proppant and Fluid Schedule

Stage	Fluid Volume US Gallons	Proppant Concentration pounds/gallon	Proppant Size Mesh
1	20,000	0.0	—
2	2,000	1.0	40/70 or 100
3	3,000	2.0	40/70 or 100
4	27,000	2.0 to 10.0	12/20

The total weight of proppant used was typically 100,000 to 120,000 pounds. The 40/70 mesh sand or 100 mesh sand was added for fluid loss control. Injection rates of all stages were typically 50 to 60 barrels per minute. All injection was down the casing because of the high rates used. The cross-linked fluid used was generally 30 to 40 lbm of HPG (hydroxypropylguar) polymer per 1,000 gallons of fluid, cross-linked with a borate ion.[31] Treatments of this type typically require high injection pressure gradients exceeding 1.0 psi/ft when the coal seams are located within impermeable shale zones.[32] Treating pressures were observed to be less than the overburden gradient when the coal seams were located adjacent to the underlying Picture Cliffs Sandstone due to downward height growth into the sand. The resulting fracture geometry can be quite complex containing multiple vertical as well as horizontal components.[33] Warrior Basin cross-linked gel stimulations are similar.[34]

Open-Hole Cavity Completions

Meridian Oil Company in 1988[35] became the first San Juan Basin operator to widely use a completion technique that resulted in formation of a cavity in a coal gas reservoir. After production data for several new Meridian cavity wells became available in the public domain, many operators with Fruitland coal acreage in the San Juan Basin became interested in the cavity technique. Wells completed with cavities are often, but not always, outperforming adjacent wells completed by running and cementing casing followed by perforation and hydraulic fracture stimulation. The stimulation of cased wells has been required in an attempt to effectively connect the coal reservoir to the wellbore and to bypass damage to near-wellbore permeability.

The Fruitland gas well cavity completion technique has since been successfully applied by several operators in addition to Meridian in the high voltaile A bituminous

and greater rank area[36] of the northern San Juan Basin. Figure 10 illustrates the number of cavity completion attempts per township throughout the basin.[37] Approximately 870 cavity completion attempts had been performed as of September, 1991,[37] out of a total of roughly 2,200 wells.

As an example, Devon Energy Corporation has applied the cavity completion technology very successfully in the Northeast Blanco Unit that is located in San Juan and Rio Arriba counties of New Mexico.[36] Devon's original plans called for completing wells with cased, hydraulic fracture technology as well as with cavity techniques. Based upon the initial gas and water productivity of the cavity wells, the original ten cased, fractured wells were replaced with new wells completed with cavities.[39] These new wells were located with 300 feet of the original cased, fractured well locations. The initial gas production rates of the cavity completions reported while cavitating were approximately twenty-one times the initial gas production rates of the cased, fractured wells. The ratio between the stabilized cavity well gas production rates and the cased, fractured well initial rates was 6.7. This disparity in Fruitland coal well initial and long term gas production rates from the two completion types can be illustrated with other examples from the Cedar Hill, Meridian 400, and portions of the northern Ignacio Blanco Field, all of which are in the northern San Juan Basin.

Open-hole cavity wells are installed using a controlled blowout technique in the following approximate manner. The exact procedures differ due to the operator's preferences.

Table 4. General San Juan Basin Cavity Completion Procedure

Step	Description
1.	Drill to within several meters of the top of the coal interval of interest using a conventional rotary drilling rig.
2.	Cement production casing to surface. Release the drilling rig.
3.	Rig up a modified completion rig capable of controlling coal reservoir pressures with blow-out prevention equipment and drilling with a hydraulically operated power swivel.
4.	Drill through the coal seams and innerburden with water. Allow the well to flow while drilling and produce solid material, gas, and water to a flare pit.
5.	Pull the drill bit up into the casing. Pressure up the wellbore and near-well region with air and water. Allow the pressured well to blow out to a pit.
6.	Periodically drill back to the original total depth of the well while circulating solid material to surface. Continue circulation until the wellbore remains relatively free of solid material.
7.	Repeat the injection, blow out, clean out sequence until the cavity is stabilized. Stabilization is deemed to occur when production of solids is minimal or non-existent and when fluid production rates are not improved by continued cavitation.
8.	Install the tubing and well head equipment and move the completion rig off location.

Operators have been successful in re-working existing cased hydraulically fractured wells to convert to cavity completions. The most common method used in the remedial efforts is to abandon the perforated, fractured interval and to mill a window in the casing 100 to 200 feet above the Fruitland coal interval.[40] A whip stock is set in the

casing below the window and the well is side tracked through the coal interval. The side tracked hole is then cavitated in the same manner as the newly drilled wells. Bowen/Edwards & Associates have converted a cased well to a cavity completion by milling a window in the casing across the coal seams and then cavitating in the usual manner.[41]

GRI has funded two major research efforts to increase the understanding of the affect of the cavitation completion upon the coal gas reservoir production behavior. The first project was performed in cooperation with Amoco Production Co. at the COAL Site discussed earlier. The second project was performed with ARCO Oil & Gas Company at a location referred to as the Vertical COAL Site located in Section 10 of Township 32 North, Range 10 West, La Plata County, Colorado, approximately 3 miles from the COAL Site.[21]

The success of the cavitation process is believed due to the ability to effectively link the wellbore to the natural fracture system of both coal and non-coal lithologies. The ability is believed to be due to the rapidly repetitive injection-production cycles. The injection of air followed by the rapid expansion of the air upon production likely propagates along existing fractures and increases the natural conductivity by increasing the aperture width. The increased aperture width may be retained due to self propping by cleat surface micro-rugosity and support by authigenic mineralization along cleat walls.[42] While the near-well average permeability is increased, it is still the existing natural fracture permeability away from the well that controls the commercial productivity of the reservoir.

The cavity completion results in a very rugose wellbore condition. Figure 11 illutrates the COAL Site cavity geometry measured with a sonar log. The total volume of the cavity was approximately 2,700 cubic feet caused by removal of roughly 100 tons of coal. The average diameter

of the cavity was 8.6 feet with a maximum diameter of 10.8 feet.

The following table summarizes the conclusions reached by evaluation of data at the two research sites.

Table 6. Summary of GRI Cavity Completion Research Conclusions

Item	Conclusion
1.	The cavity completion effectively links the wellbore with the natural fracture system of the reservoir. The increased fluid productivity is primarily due to more effective linking than existed prior to cavitation.
2.	The cavity accounts for a 60% increase in the fluid productivity.
3.	Formation damage is minimized by the lack of contact between the coal reservoir rock and drilling fluids.
4.	At the COAL Site, the deliverability of gas and water to the well prior to cavitation was controlled by butt cleat conductivity.
5.	At the COAL Site, the deliverability of gas and water after cavitation is controlled by a conductivity equal to the face cleat conductivity.
6.	At the COAL Site, the absolute permeability controlling production temporarily increased during the cavitation operations. The long term productivity after 28 days of production was controlled by the original absolute permeability of the natural fracture system.
7.	Cavitation of the cavity well at the Vertical COAL Site did not improve the gas productivity since the uppermost coal seams were in effective communication with the well prior to cavitation.
8.	Additional research is required to optimize the cavitation process and increase the applicability to cased, hydraulically fractured wells without the need for milling windows in the existing casing.

Drilling Techniques and Completion Equipment

This section reviews the drilling techniques and completion equipment required to install and operate coal gas reservoir production wells. The technology is the same as that used to drill and operate wells in other reservoir types.

Originally, San Juan Basin Fruitland Formation coal gas wells were rotary drilled with mud and completed open hole with under reaming techniques.[36] Failure to maintain hole stability led operators to convert to conventional mud drilling technology after which casing was landed and cemented in place. Communication with the reservoir was achieved by jet perforation followed by hydraulic fracture stimulation. Recently, operators have turned to the open-hole cavitation techniques.

To maintain stability, conventional wells are drilled with rotary drilling rig[43] utilizing a fresh water and bentonite (gel) mud system with barite for density control. Drilling fluid density is controlled to achieve a mud hydrostatic head 0.1 to 0.5 psi/ft greater than the formation pressure gradient to reduce formation damage.

The size of the drilling rigs ranges from those capable of pulling single 30 foot joints of pipe to those capable of pulling three joints of pipe. The most common rig size is capable of pulling doubles. Location pads are several hundred feet square to accommodate the rig, air compression equipment, generators, mud pumps, the mud tank circulation system, and reserve/flare pits. Often the drilling pad of an existing well drilled to a deeper horizon is used to minimize location preparation costs.

Surface hole is drilled with a 12¼ inch bit to 250 feet at which depth surface casing is set. The common surface casing specifications are 8⅝ inch, 24 lbm/ft, J-55, cemented with Class B cement containing 2% CaCl. Wells are commonly drilled to total depth using a 7⅞ inch bit. The cased hole depth is generally 100 to 200 feet deeper

than the deepest coal so as to allow installation of a pump below the seams and to provide a sump for produced solid material. The most common production casing utilized is 5½ inch, 23 lbm/ft, K55. Cementing is accomplished by circulating cement spacer and 500 sacks of light weight cement followed by approximately 100 sacks of Class B cement. This type of cased hole well is generally completed by jet perforation and hydraulic fracture stimulation.

The techniques used to drill open cavity wells are somewhat different. A conventional rotary rig is used. The mud system generally consists of a fresh water, natural mud system. Small concentrations of polymer may be added for viscosity control. Larger bits and casing are utilized and casing is set above the uppermost Fruitland coal seam. The surface hole is drilled with a 12¼ inch bit. Surface casing size is commonly 9½ inch, 38 lbm/ft. The top set hole is drilled with a 8¾ inch bit. Production casing is commonly 7 inch, 23 lbm/ft, N-80. The casing is set above the coal seams and cemented with Class B cement. The coal and other rocks are then drilled with fresh water and completed open hole.

Tubing sizes generally vary from an outer diameter of 2⅜ inches to 5 inches. Packers are generally not installed in the wells. Flowing wells are allowed to produce up either the tubing or the tubing-casing annulus. Pumping wells have pumps installed in the tubing. Water is produced up the tubing while gas is allowed to produce up the tubing-casing annulus.

Artificial Lift

Artifiicial lift is very common in the petroleum industry to reduce the bottom hole production pressure for wells that produce liquids. A reduction in the bottom-hole pressure generally results in an increase in the fluid production

rates. A desire to reduce the bottom-hole pressure is the reason that some coal natural gas wells have artificial lift systems installed. Many Fruitland Formation coal gas wells produce gase and water without artificial lift.

The most common artificial lift system for coal natural gas production is a sucker rod insert pump although the progressive cavity pump has been in wide use for the relatively shallow reservoirs in the Warrior Basin. Gas lift systems are in use in the San Juan Basin generally to initially produce a high rate water producing well. Open hole cavity wells usually have no artificial lift installed although some operators have installed gas lift systems. Gas lift systems are usually not installed for long term use as it is not possible to decrease bottom-hole pressures to the levels possible with pump systems.

In pumped wells, gas is allowed to produce up the annulus while water and solids are pumped up the tubing that is usually 2⅞ or 2⅜ inches in diameter. Pump placement is often below the lowest perforation to minimize gas locked pump problems. Pump designs also incorporate anti-gas lock systems such as gas anchors. In high rate water wells, blast joints are placed across perforated intervals to reduce erosion induced tubing failures.

In the San Juan Basin, the most common system in use is a sucker rod system. Pump jack sizes include 180, 300, and 640 peak torque rating with 64 to 200 inch stroke lengths.[44] The prime movers for the pump jacks are often wellhead gas or propane fired unless electricity is available in the field. A Martin split ring type plunger pump placed in the tubing with undersized rings provides solids production tolerance required by coal fine material production. These type systems are capable of pumping 2,500 B/D although the most common size is in the 800 B/D range.

Surface Equipment

San Juan Basin surface equipment is designed to separate gas and water production and to handle minor amounts of solid material production. Identical equipment is used for production of natural gas and liquids from non-coal reservoirs.

The northern San Juan Basin reservoirs are over-hydrostatically pressured with surface shut-in pressures approaching 1,500 psig in some instances. The wellhead equipment is usually over-designed to a 3,000 psig working pressure. Although carbon dioxide production is quite significant with carbon dioxide mole fractions ranging from 1 to 15% in the produced gas stream, most operators have not used welhead equipment designed for carbon dioxide service due to the significant increase in cost.

San Juan Basin surface flow lines are typically 2 or 3 inch schedule 80 steel pipe. The pipe size is selected based upon the water volume to be produced and the distance to the separation facilities.

The common San Juan Basin separator is a standard horizontal or vertical production separator designed to either 1,000 or 1,440 psig working pressure. The separator is operated at the lowest possible pressure above the gas pipeline pressure to reduce the back pressure on the wellhead. Water baths may be necessary to prevent freezing during winter operations.

Depending upon the water disposal system in use it may be necessary to have up to 2,000 barrels of water storage capacity located at the separation facility. These tanks are typically heated during the winter to prevent freezing.

Compression of the produced gas can be required depending upon the sales line pressure. Typical San Juan Basin multi-well compression facilities consists of 300 to 500 horsepower, two or three stage, compressors with a 500 psig discharge pressure. Single well installations include

50 to 100 hp compressors installed adjacent to the well. The prime movers are generally fired by natural gas.

The natural gas is eventually compressed into the gas transportation systems that move the gas to the end user. The gas pipelines companies do not differentiate sales price or acceptability of gas based upon the reservoir type that the gas was produced from. As for gas production from other reservoir types, treatment may be required to reduce the concentration of contaminants such as carbon dioxide to pipeline quality specifications.

Effect of Gas Production Upon Coal Mining Operations

This section briefly discusses the effect of gas production upon coal mining operations. Generally, as mine operators are attempting to recover coal from deeper depths of burial, natural gas content of the coal increases that in turn increases the hazards due to explosions. In some areas, it is necessary to reduce the pressure contained within the coal to reduce the chances of a sudden rock outburst at the mine face. Extraction of the gas has no effect upon the coal properties that dictate the heating value or the end use of the coal.

Mine Safety Requirements

Regulations that provide standards for the underground coal mines are formulated by the Mine Safety and Health Administration ("MSHA") of the U.S. Department of Labor. Ventilation requirements by MSHA are detailed in 30 CFR part 75.300 sub-part D-Ventilation.[45] The ventilation requirements provide minimum standards for air quality, quantity, techniques and frequency of examinations, etc. However, each individual mine operator must submit for MSHA District Manager approval a specific natural gas and dust control plan for their underground coal mine operation. Generally, natural gas concentrations in an *active* working section and return air courses may not exceed one percent. In bleeder entries, inactive

areas and other special circumstances, the allowable maximum natural gas concentration is increased to two percent.

Mine ventilation systems alone may be inadequate to dilute methane concentrations below acceptable concentrations. Degasification techniques designed to produce natural gas in advance or in conjunction with mining have become more prevalent in the last decade. A brief overview of techniques commonly used by industry follows.

Degasification Techniques

Degasification approach for the Mine includes both "active" and "passive" degasification techniques. A brief overview of techniques commonly used by industry follows.

Active pre-mining degasification techniques include in-seam horizontal boreholes or stimulated vertical wells drilled in advance of mining. These techniques: (i) actively degasify the objective coal seam in advance of mining operations, and (ii) identify and degasify gas feeders associated with geologic anomalies.

Vertical degasification wells are typically stimulated with hydraulic fractures for gas production enhancement. Recent studies by the U.S. Bureau of Mines have indicated that the affect of hydraulic stimulation on the mineability of the coal seam is negligible. The major concern of operators is that the induced fractures will reduce the integrity of the roof rock resulting in roof falls. Numerous experiments have been performed by mining through induced fractures with little or no detrimental effects. In fact the Bureau of Mines has concluded that "No roof falls or adverse mining conditions were encountered that could be attributed to the stimulations."[46]

Horizontal boreholes are drilled from within the mine workings when accessibility to the coal is possible. Many longwall mines actively degasify the coal seam by employ-

ing relatively short, cross-panel degasification boreholes. Boreholes are drilled perpendicular to the longwall panels. Prior to mine-through, the cross-panel boreholes may be configured with packers for water infusion to improve dust control during mining.

An alternative to short cross-panel boreholes is to install long horizontal boreholes perpendicular to several longwall panels. Long cross-panel boreholes (e.g. 2,000 feet) may be drilled as soon as a longwall area is outlined on one side. Degasification of several longwall panels and development entries may be accomplished by a single series of boreholes. Prior to mine-through by the development section, the boreholes can be flooded with water to reduce dust emissions. After mine-through, a packer may be set to allow continued production of the initial portion of the borehole through the existing pipeline. Another pipeline is installed after mine through to continue production of the remainder of the borehole.

Long horizontal boreholes with lengths in excess of 4,000 feet can be drilled into virgin coal to produce gas far in advance of mining. This technique can be used to facilitate the construction of the initial mine gate roads.

Passive degasification techniques produce little to no gas prior to mining and are typically completed in strata above the coal seam. Gas production is initiated as a result of subsidence after mining occurs. Generally, the use of a surface blower/exhauster is required to enhance gob gas productivity due to the low pressure within the gob area. Passive degasification techniques include vertical gob ventilation boreholes, short cross-measure boreholes and long gob holes drilled from within a mine.

Vertical gob ventilation boreholes are commonly used in conjunction with longwall panels in eastern mines. Two to four boreholes are drilled per panel, slightly offset from center. A typical borehole is completed fifty feet above the coal seam being mined with the last two hundred feet completed with slotted casing.

Cros-measure boreholes are small-diameter, inclined boreholes drilled from underground locations into roof strata overlying the longwall panel that will be fractured when the panel is removed. Gob gas is collected from the cross-measure boreholes and drawn through an underground pipeline to a vertical well using a surface vacuum pump.

Conclusion

In my opinion, the matters discussed in the preceding sections establish, from the technical and scientific point of view, that the natural gas found in coal seams (often referred to as "coalbed methane") is separate and distinct from the coal itself and should be considered in the same manner as natural gas from any other type of natural gas reservoir.

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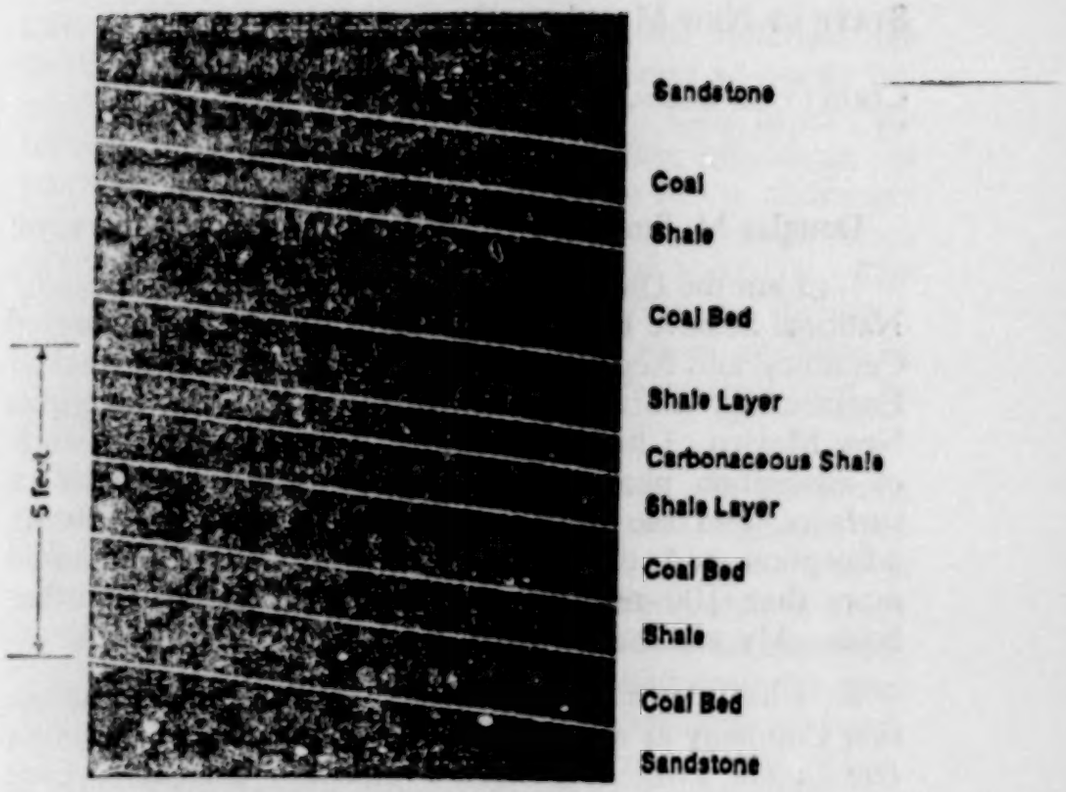

Figure 2.
Interbedded Raton Basin Coal Zone

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

AFFIDAVIT

Douglas M. Smith, being duly sworn, deposes and says:

1. I am the Director of the University of New Mexico/National Science Foundation Center for Micro-Engineered Ceramics, and Regents Professor of Chemical and Nuclear Engineering, University of New Mexico, Albuquerque, New Mexico. I have engaged for many year in the study of adsorption phenomena, the physics and chemistry of surfaces, and the behavior of gases and liquids during adsorption and desorption processes. I have authored more than 100 refereed publications in these and other fields. My curriculum vitae is attached as Exhibit A.

2. I have been engaged by counsel for Amoco Production Company as a consultant in connection with *Southern Ute Indian Tribe v. Amoco Production Company,* Civil Action No. 91-B-2273, United States District Court for the District of Colorado, and have submitted a report and have been deposed in that action. A copy of my report entitled "Coalbed Methane Adsorption and Migration" is attached as Exhibit B, and I adopt and make this report part of this affidavit.

3. Among other matters, I have reviewed the portions of the brief submitted by the plaintiff in connection with summary judgment motion, the affidavits of Messrs. Bend, Cooper, Creel, Levine and Marsh furnished with that brief, and the reports previously furnished by them to Amoco's counsel. I am making this affidavit in partial response to some of the matters and issues raised in those materials.

4. Coal, like nearly all solid materials, is porous, and can adsorb gas on its external and internal surfaces. Coal is not unique in that regard. The porosity of solid materials varies greatly, from extremely porous materials like zeolite (a material used in water softeners) to nearly impervious materials such as solid metals. Coal as an "adsorbate" (*i.e.*, a material onto which other substances are adsorbed as "adsorbents") is somewhere in the midranges of porosity. Adsorption takes place in openings, often referred to as "pores," within the solid materials. The more such openings there are, the smaller the diameter, and the higher the total volume of the space available in such openings, the more of the adsorbent which will be adsorbed.

5. Adsorption is a common phenomena. In every case where gases and solid surfaces are present together, gas will be adsorbed onto the surface. Thus, oxygen or air is adsorbed on the surfaces of walls, furniture, etc., in every room. When gas is physically adsorbed onto an adsorbent (such as methane on coal), the adsorbed material does not remain static. The molecules are constantly exchanging with other molecules found in different states. Thus, in coal, if methane is present it will be found within the empty spaces within the solid coal as a gas, as adsorbed molecules on the coal surfaces and dissolved in any water which may be present. The methane in the three states is constantly exchanging from one state to the other, with the system being in equilibrium, unless something changes, such as the ambient pressure, in which the relative proportions in the various states will change in accordance with known laws. This situation exists in all adsorbent-adsorbate systems; it is not unique to coal. It also exists in all natural gas reservoirs; only the relative quantities change depending on the properties of the particular substances involved, not the basic mechanisms.

6. The process by which methane is adsorbed on coal is generally reversible, and the methane can be adsorbed and desorbed without any change in the chemical nature of either the methane or the coal, merely by changing the pressure. Coal can adsorb any gas with low molecular

weight, and desorb it as well. In neither case does either the adsorbed gas or the coal change its essential nature.

7. These general principles are explained more fully in the report attached as Exhibit B.

8. The term "grid locked" is used in the plaintiff's brief, Br. 32. To my knowledge, this is not a term with a scientific or technical meaning. If it is intended to mean that methane is static within the coal and that the state of the methane does not change within the equilibrated system, or that the methane will stay within the coal when the pressure changes, then it is misleading and inaccurate. Professor Marsh seems to say, however, that it means no more than that "coalbed methane is located primarily within the macro-molecular structure of minerals." Marsh Affd, p. 9, ¶ 4.3.7. This says only that the empty spaces (*i.e.*, the pores where the methane is adsorbed) are inside the solid coal material (*i.e.*, macerals), a fact which is obvious.

Dated this 5th day of November, 1993.

/s/ Douglas S. Smith
DOUGLAS S. SMITH

[Notary Omitted]

Coalbed Methane
Adsorption and Migration

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Summary

Per your request, a description of the storage and migration of coalbed methane is presented. Methane and other gases such as carbon dioxide, ethane, nitrogen, etc. produced from the coalification process and possibly, from migration from deeper source formations, accumulate in the coal seam. This gas actually exists as an equalibrium system between three different states; free gas, adsorbed gas, and dissolved gas in water. The adsorbed gas is the result of physical adsorption which is a reversible process. Individual molecules are rapidly and continually exchanging from one state to another. As an example, the characteristic time when an individual molecule is *adsorbed is on the order to one millionth of a second.* This situation is no different than for other natural gas formations except that the relative fraction in the adsorbed state is higher because of the higher surface area to pore volume ratio of coal. However, coal is not unique in its pore structure and adsorption capacity and actually has mediocre properties as compared to many adsorbents such as activated carbons and zeolites. As the pressure in the coal formation is lowered, gas and water flow to the wellbore. As the pressure is lowered, gas desorbs from the adsorbed state and gas is released from the dissolved gas state. During production, water is removed from the fractures in the coal, which allows higher production rates because of the higher relative permeability as in any gas reservoir. However, because of the great affinity (both adsorption and capillary pressure related), water is never removed from the microporosity of the coal during production.

I. Introduction

The term coalbed methane refers to a mixture of gases produced from coal seams for degasification purposes before mining or the commercial production of natural gas. Despite the name, coalbed methane includes a number of gases including methane, ethane, propane, trace

quantities of higher hydrocarbons, nitrogen, carbon dioxide, water, and helium. In the remainder of this report this term will be used and implies a gas mixture. In a coal seam, gas occurs in three different states; 1) free gas, 2) adsorbed gas, and 3) dissolved gas in water. These three states are in equilibrium and there exists a constant and rapid interchange of molecules between the three states. Therefore, it is impossible to think of each state as being independent but rather, all three must be considered as a single system. These three states are characteristic of all natural gas reservoirs. The relative fractions of gas in these three states for a given reservoir depends upon the water content, the internal surface area to pore volume ratio, the pore size, temperature, and pressure of the reservoir. As the pressure is lowered, the fraction of gas adsorbed on the surface will decrease. Because of the higher surface area to pore volume ratio of coals resulting from their smaller pore sizes as compared to most natural gas reservoirs, a larger fraction of gas at a given instant occurs as adsorbed gas.

II. Definitions

Since the coal literature is filled with confusing terminology, it is important to start with a set of definitions in the areas of adsorption and porosity.

II.1 Adsorption

All molecules in the gas state ("free gas") undergo interactions with solid surfaces. For all surfaces, a certain fraction of the surface is covered with adsorbed molecules ("adsorbed gas"). These adsorbed molecules have properties such as density which are much closer to those of a liquid or solid than that of the free gas. The fraction of the surface which is covered depends upon the gas, its pressure, and temperature. The relative fractions of free and adsorbed gas thus depends on the fraction of surface covered and the surface area to pore volume ratio of the

porous solid. The forces which cause adsorption vary but adsorption can be broken down into two distinct subsets, physisorption and chemisorption. Because these two subsets are different, they will be discussed separately.

II.1.a Physisorption or Physical Adsorption—This type of adsorption is nonspecific and is similar to condensation (the phase change of a gas to a liquid). Weak van der Waals (attractive "dispersion" and repulsive) forces lead to *heats of adsorption which are on the same order as the heat of condensation, 0.5 to 5.0 kcal/mole* (Smith [1970]). Equilibrium is rapidly achieved between the free gas and adsorbed states and the amount adsorbed is a function of temperature. Physical adsorption is usually nonspecific and is observed for all gases and surfaces. The effect of polarity in either the adsorbate (the gas) or the adsorbent (the solid) can serve to increase the adsorption attraction between the surface and gas and thus, make physical adsorption specific. For nonspecific physical adsorption, only dispersion and repulsive forces are involved as discussed above. For specific physical adsorption, coulombic interactions add to the adsorption attractions. However, for saturated hydrocarbons such as methane, ethane, propane, etc., specific physical adsorption will not occur as demonstrated via the Kiselev [1965] classification system (note: this is not true for water which both physically adsorbs on specific sites and chemisorbs as discussed in subsequent sections). The chemical nature of the adsorbed gas is very similar to that of condensed gas as measured with probes such as infra-red, Raman, and nuclear magnetic resonance spectrocopy. The quantity of gas adsorbed at a given pressure and temperature is proportional to the total surface area.

Since the interactions causing physical adsorption are similar to phase change, the process is *reversible*. Physical adsorption is a dynamic process in which molecules are always leaving the surface for the free gas and new molecules are always adsorbing. Hence, the net quantity ad-

sorbed at a given time is related to the relative rates of adsorption (condensation) and desorption (evaporation). de Boer (1953) has written a text on this point in which he introduced the concept of an adsorption time. At 25°C and for the heats of adsorption characteristic of physical adsorption (0.5 to 5 kcal/mole), typical residence times as adsorbed gas on the surface are of the order of 10^{-12} to 10^{-7} seconds. If one were able to observe a single gas molecule in space, it would strike the surface (assuming that the surface is not already covered with adsorbed molecules), remain adsorbed for these very short times, and then desorb and again become a free gas molecule.

II.1.b Chemisorption or Chemical Adsorption—In contrast to physisorption, chemical adsorption involves the formation of strong chemical (ionic, covalent) bonds between the surface and the adsorbed molecules. Heats of adsorption are on the order of those involved in chemical reactions, 5 to 100 kcal/mole. Chemisorption is usually irreversible and is limited to certain solids and gases. The chemical nature of the adsorbed gas is distinctly different than that of condensed gas as measured with probes such as infra-red, Raman, and nuclear magnetic resonance spectroscopy. The quantity of gas adsorbed at a given pressure and temperature is usually not proportional to the total surface area.

II.1.c The Adsorption Isotherm—The magnitude of adsorption for a particular gas and solid is usually presented as an adsorption isotherm. This is a plot which indicates the quantity of gas adsorbed (usually in moles or volume of gas per mass of solid) as a function of gas pressure at a fixed temperature. This plot is usually determined experimentally. Often, the pressure (P) scale is normalized by the saturation pressure (P_o) of the gas at that temperature. P_o is the pressure at which the gas will condense to a liquid at that temperature. Thus, at relative pressure (P/P_o) equal to one, the porous solid will spontaneously fill with liquid. The shape of the isotherm is a

function of the pore size distribution of the adsorbent and the relative attraction of the gas and surface.

A large number of models have been proposed to describe the variation in gas uptake with pressure. One of the simplest and most often applied for microporous materials is the Langmuir isotherm (Langmuir, [1916]). At equilibrium, the rates of adsorption and desorption must be equal. The rate of adsorption is obtained from kinetic theory of gases and the assumption that molecles will only absorb if they strike the surface where no adsorbate exists. Thus the rate of adsorption is proportional to the fraction of surface which is not covered. The desorption (evaporation) rate is the same as for evaporation from a liquid except that it is proportional to the fraction of the surface which is covered and the heat of adsorption is used instead of the heat of condensation (although both are of the same order for physial adsorption). From this, the Langmuir isotherm is obtained which relates the adsorption uptake to the gas pressure and constants, V_m and b. The isotherm is $V/V_m = bP/(1+bP)$. V_m is the monolayer capacity and b is a constant related to the temperature and the interaction between the gas and the surface. A typical isotherm is plotted in Figure 1.

Many other isotherms exist and all include the concept that adsorption is a dynamic process but the Langmuir model is the predominant model used for high pressure methane adsorption. One isotherm of note is the Braunauer-Emmit-Teller (BET) isotherm which is an extension of the Langmuir isotherm. The BET model is used in conjunction with nitrogen adsorption at 77 K to yield the total surface area. For microporous materials, the determination of surface area is more problematic and depends upon the type of material. For carbons and coals, the standard method of surface area determination is to use carbon dioxide adsorption at 273 K (Walker and Kini [1965]) and analyze the resulting adsorption isotherm using the

Dubinin-Polyani or Dubinin-Radushkevich equations (see Gregg and Sing, [1982]).

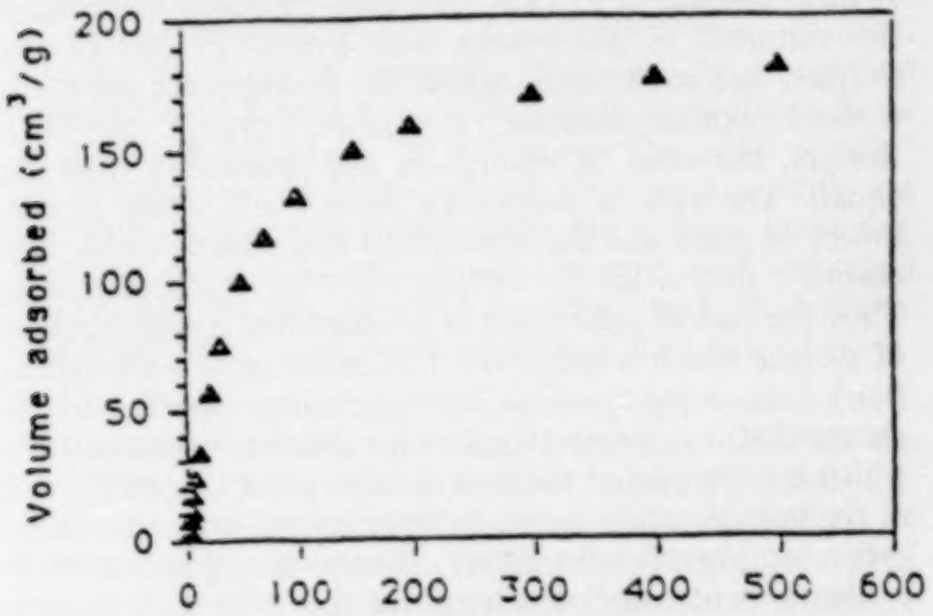


Figure 1 Langmuir isotherm for a V_m value of 200 cm^3/g and a b value of 0.002 $psia^{-1}$.

II.2 Porosity

Most solids of practical interest contain porosity on some length scale. The presence of this porosity may be favorable (i.e., the pores in a sponge leading to its compressibility, the pores in bread created by carbon dioxide generation causing the bread's texture, the pores in zeolites used in detergents to adsorb and ion exchange ions in hard water, pores in polyuretane insulation to lower heat conduction) or unfavorable (the pores contained in steel as a result of excessive dissolved gas leading to lower mechanical strength, pores in glass affecting clarity, etc.). Because pore structure is of such interest, structure evolution and the porous solid characterization are significant areas of scientific investigation.

Porosity occures over many length scales from defects in crystalline materials (<0.1 nm) to large cracks/fractures/voids which may be on the same order as the sample itself. Porosity may be open (accessible to gases) or closed (inaccessible to gases). In general, porosity is defined as the volume fraction of a porous solid which is not a dense solid. One way to determine this value is to measure the bulk density (the mass of solid per total volume) designated as pb via displacement in a nonwetting fluid such as mercury and the true or skeletal density designated as pt by displacement with helium. Density values are typically given in units of g/cm^3. The porosity, ϵ, is then given by $\epsilon = 1\text{-}pb/pt$ assuming that no closed porosity exists. Another approach is to measure the pore volume which is the volume of pores per mass of solid by gas adsorption/condensation or mercury porosimetry (defined below). The pore volume, Vp, normally has units of cm^3/g and is related to the porosity by $\epsilon = Vp/pb$ or $\epsilon = Vp/(Vp\text{-}1/pt)$. The properties of a porous solid are typically fixed by three main structural parameters; the porosity, the surface area, and the pore size distribution. Since surface area is almost always measured by adsorption, that point was covered in Section II.1. Pore size classification and measurement is discussed below.

II.2a Microporosity—Pores with characteristic width of less than 2nm. The adsorption interaction potential is significantly higher than on a flat surface as a result of the close proximity of both pore walls. This leads to greater uptake of a given gas at a fixed temperature and pressure. This occurs because of the greater adsorption potential and the high internal surface area to volume ratio of these solids. Many commercial adsorbents such as activated carbons, zeolites, and silica gels contain primarily microporosity. Microporosity is sometimes divided further into ultramicropores and supermicropores.

II.2b Mesoporosity—Pores with characteristic widths between 2 and 50 nm. In addition to adsorption, when the pressure of the gas is sufficiently high, P/Po>0.3, capillary condensation of gas may occur in the pores as a result of the Kelvin effect. The Kelvin effect arises from the change in saturation pressure as a function of curvature. In small pores, condensation occurs at lower pressure because of the small pore size. This does not occur for micropores since the pores are completely filled before sufficient pressure is reached to enable condensation.

II.2c Macroporosity—Pores with characteristic widths greater than 50 nm. These pores are sufficiently large such that the pores may be considered to be a flat surface from an adsorption viewpoint. At a given relative pressure, the fraction of free gas to adsorbed gas is much higher since the surface area to pore volume ratio is much lower.

II2.d Pore size measurement—A number of different techniques exist for measuring pore size depending upon both the pore size and the material. The main techniques are summarized below.

II.2.d.1 Adsorption/Condensation—These two techniques are combined since they both employ the same basic experimental measurement (an adsorption isotherm) but employ different physical principles, theoretical analysis, and different pressure regions of the isotherm. For mesoporous solids, the lowering of the pressure required for gas to condense as a result of pore curvature is used to obtain a pore size distribution for pores in the size range of 2 to 100 nm. Analysis consists of analyzing either the adsorption or desorption branches of the isotherm in the relative pressure range of 0.3 to 0.99 using the Kelvin equation and a model isotherm to correct for the thickness of the adsorbed phase before condensation occurs. For microporous solids, the enhancement of adsorption as a function of pore size in the P/Po range of 0 to 0.3 is used to obtain a pore size distribution. This approach is very

model dependent. Techniques employed include a series of models proposed by Dubinin and co-workers (D-R, D-A), the mp method, the a-plot method, and the H-K method.

II.2.d.2 Mercury porosimetry—This employs the fact that mercury will not wet a surface and thus, must be forced into a pore. The pressure required to force the mercury into a pore is a measure of pore size. From the mercury surface tension, the contact angle that the mercury meniscus forms in a pore, and the pore geometry, the pore size may be found from the pressure using the Washburn equation. For a typical contact angle, a pressure of 30,000 psia will force mercury into a pore of 3 nm radius. Intrusion at lower pressures implies larger pores.

II.2.d.3 Scattering—Scattering techniques such as small angle X-ray (SAXS) and small angle neutron (SANS) scattering probe pore structure on the 0.3 to 100 nm range. Scattering probes both open and closed porosity but suffers from disadvantages include the relation of scattering intensity versus scattering vector size and the fact that it is affected by hetrogeneities in the solid phase.

II.2.d.4 Other methods—Many other techniques exist for studying pore structure including low field NMR, high field NMR, microscopy (SEM, TEM, optical), thermoporometry, and positron emission decay. However, these techniques are more specialized and not in general use.

II.2.d.5 Notes on pore sizing—It is important to point out that pore size analysis is almost always conducted on dried samples. Of course, drying changes the pore structure of many materials as the capillary pressure associated with fluid removal causes some pore collapse/shrinkage.

III. Coal Pore Structure

Because the ability of coal to adsorb large quantities of gas is related to its pore structure, a review of the pore

structure of coal is necessary. Before this discussion is started, it should be noted that almost all pore structure characterization has been conducted on *dried coals*. As with all porous materials with fine pores which are initially wet, the pore structure will change during drying. This is a result of the large capillary forces exerted on the pores during drying. The extent of shrinkage is a balance between the capillary pressure (which is inversely proportional to pore size) and the solid matrix strength (or modulus). For weak amorphous materials such as silica gels and coals, the extent of shrinkage can be significant and hence, the pore structure information reported in the literature may not be directly relevant to coal pore structure in the formation. But during production of coalbed methane, the micropores never dry out and hence, the majority of the shrinkage observed during complete drying in the laboratory will not occur.

The main efforts on pore structure characterization of coal have been reported by Anderson and co-workers [1956] and by Walker's group at Penn State as reported by Gan, Nandi, and Walker [1972]. Reviews on coal pore structure characterization have been published by Mahajan and Walker (1978), Mahajan (1982), and Mahajan (1984). The pore structure of coal is complex and heterogeneous and consists of pores ranging in size from those of helium dimensions (~0.2 nm) to large macropores. Coals share many similarities with activated carbons derived from natural sources such as coconut chars. The pore structure of coal is a function of rank. Typically, the porosity varies from 5 to 20% with the majority of the porosity existing in micropores. This leads to surface areas from CO_2 adsorption on the order of 200 m^2/g. Typical pore sizes in the micropore region are on the order of 0.8 to 1.2 nm for coal. Some variation in surface area with rank is observed but in general, all coal surface areas are in the range of 100 to 400 m^2/g. By comparison, surface areas of commercial adsorbents are generally higher (e.g., silica gels 100-1,000 m^2/g, activated carbons, 200-2,500 m^2/g). Gan, Nandi, and Walker [1972] used mercury porosimetry and nitrogen condensation to show that porosity exists in pore sizes in both the mesopore and macropore size ranges in addition to microporosity. In addition to the pore structure of dry coals, some work has been carried out on wet coals. Glaves and co-workers [1988] used a low field NMR technique to show that for water saturated coals, monomodal, bimodal, and trimodal pore size distributions are observed as a function of rank. Pore sizes in the micropore, mesopore, and macropore size ranges were observed. However, these were coal samples which had been previously dried and resaturated. Little other pore structure information exists for wet coals since conventional pore size analysis techniques require dry samples.

IV. Coalbed Methane

The term coalbed methane refers to a mixture of gases produced from coal seams for degasification purposes before mining or the commercial production of natural gas. Coalbed methane includes a number of gases including methane, ethane, propane, trace quantities of higher hydrocarbons, nitrogen, carbon dioxide, water, and helium. In a coal seam, gas occurs in three different states; 1) free gas, 2) adsorbed gas, and 3) dissolved gas in water. These three states are in equilibrium and there exists a constant interchange of molecules between the three states. Therefore, it is impossible to think of each state as being independent but rather, all three must be considered as a single system. These three states are characteristic of all natural gas reservoirs. The relative fractions of gas in these three states for a given reservior depends upon the water content, the internal surface area to pore volume ratio, the pore size, temperature, and pressure of the reservoir.

The quantity of gas in the free state at a given time depends solely on the reservoir pressure, temperature, and

the pore volume which is not filled with water or adsorbed gas. Therefore, the quantity of free gas may be determined directly from equations of state (i.e., thermodynamic functional relationships which relate molar density, pressure, and temperature). Free gas will only exist in the coal fractures and mesoporosity/macroporosity since the micropores will remain saturated with liquid water under reservoir conditions during coalbed methane production.

The fact that methane and other gases adsorb on coals and carbons has been known for many years. On the internal surface of coal (from fractures to micropores), gas molecules adsorb and are in dynamic equilibrium with the free gas as well as dissolved gas in water. As discussed previously, the interchange between adsorbed and free gas is extremely rapid. As the pressure is lowered, the fraction of gas adsorbed on the surface will decrease. A more complete discussion of adsorption in coal in given in a following section.

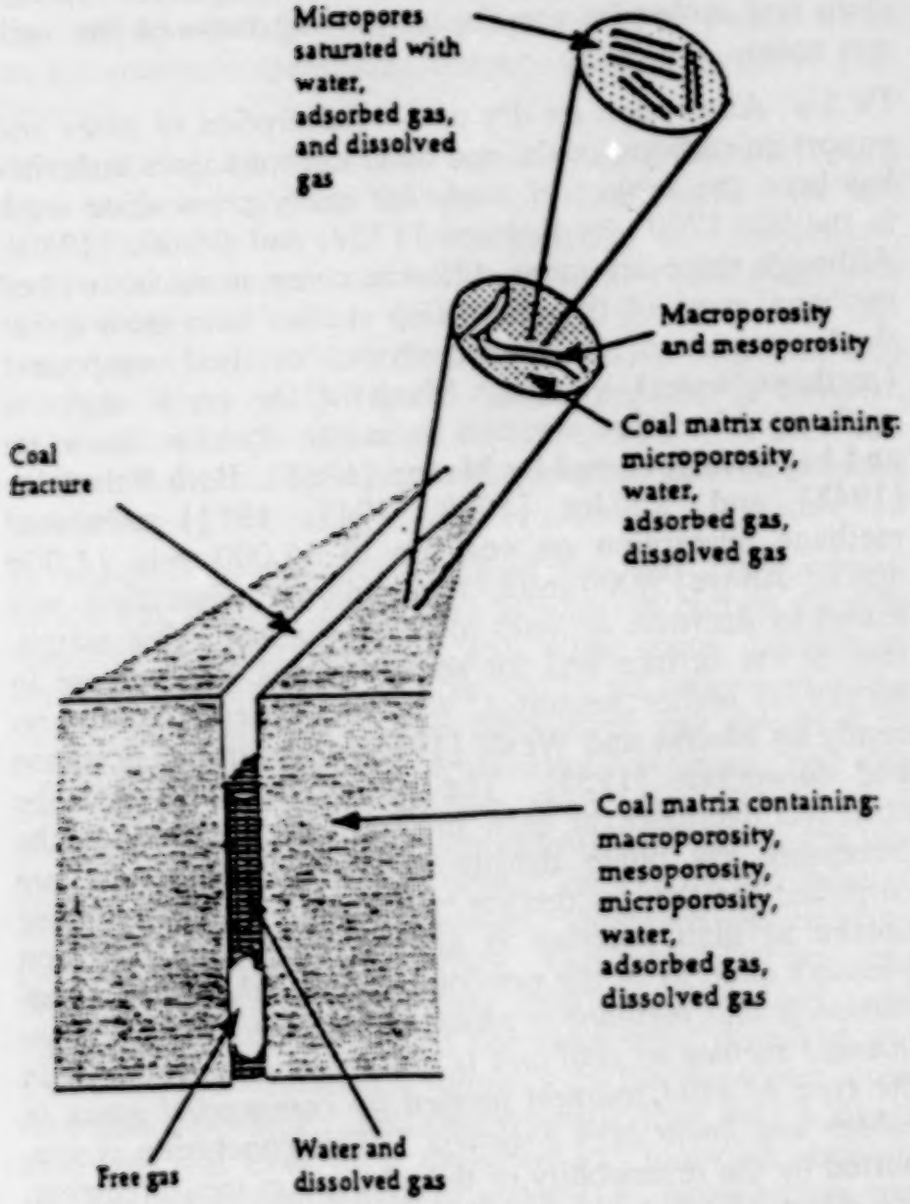
In addition to free and adsorbed gas, gas exists as dissolved gas in reservoir water. Similar to carbon dioxide dissolved in soda, methane and other gases dissolve in water. This phenomena is observed in all water-containing natural gas reservoirs. The amount of gas dissolved in water depends upon the temperature, pressure, and the solubility of the gas (typically given as a Henry's law constant which relates the concentration of gas in the gas phase to that in the liquid phase) as well as the relative water saturation of the formation. Dissolved gas and free gas are in dynamic equilibrium. Gas molecules are continually striking the gas-water interface, absorbing, and diffusing into the water. At the same time, dissolved gas molecules are continually diffusing to the gas-water interface and desorbing. The characteristic time that a single molecule will exist as a dissolved gas molecule depends on the caracteristic length of water (i.e., between free gas pockets). For a typical maximum continuous water length

of 1 mm, typical characteristic times as a dissolved gas molecule are 10 to 1,000 seconds.

Figure 2 is a conceptual diagram illustrating the distribution of coalbed methane and water in coal. However, it is important to remember that this is a dynamic equilibrium and molecules are always moving between the various states.

IV.1.a Adsorption on dry coal—Adsorption of gases and vapors on carbons, coals, and other carbonaceous materials has been the subject of study for many years since work in the late 1700's by Fontana [1777] and Scheele [1780]. Although there are many different components in coalbed methane, most of the adsorption studies have used either single component (methane, ethane) or dual component (methane/water) systems. Much of the early work on methane adsorption on coal is in the Russian literature and has been reviewed by Menon [1968]. Both Palvelelev [1948] and Khodot [1948, 1949, 1951] measured methane adsorption on coal up to 15,000 psia (1,000 atm). Above 3,000 psia, the apparent adsorption was found to decrease or only increase slightly. This saturation of the surface and for some samples, as decrease in uptake at higher pressures, was also observed more recently by Moffat and Weale [1955] and van der Sommen and co-workers [1955]. The last group concluded the observed decreases at high pressure are a result of the increasing gas phase density and when the results are corrected for the gas density, a plateau value of methane uptake at high pressure is always observed. Based on Menon's analysis of the previous papers, "*the general conclusion is that methane is physically adsorbed on the large internal surface of coal and is not chemisorbed or held in the type of solid solution formed by compressed gases in rubber and linear high polymers.*" This conclusion is supported by the reversibility of the adsorption measurements, the effect of temperature, and the limiting high pressure behavior. The main motivation for studying methane ad-

Figure 2 Pore structure and spatial distribution of coalbed methane and water.



sorption in coal was for controlling gas emissions during mining operations. In 1978, the International Energy Agency (of which the USA is a member) undertook a review of methane retention (adsorption) and migration which is summarized by Curl [1978]. This report reaffirms the concept that gas is physically adsorbed on the surface of coal. Recent reviews continue to affirm that the accepted form of methane storage in coal is via an *adsorption* process (see Ayoub et al [1991].

IV.1.b Adsorption on wet coal—Coal, as any porous material, has a finite internal surface available for adsorption. Even in 1936, it was recognized that the presence of water reduced the capacity of coal to adsorb methane (Coppens, [1936]). A number of investigators noted that increasing water contents led to lower methane uptake at a given pressure and temperature. Joubert and co-workers [1973] have shown that there exists a critical moisture content above which no further decrease in methane adsorption capacity is noted. The level of this critical moisture content was in the range of 1 to 5% water and depended upon the coal composition. They concluded that the variation in the critical moisture content coincided with the water adsorption uptake and resulted from the dependence of water adsorption on pore surface chemistry. The specific nature of water adsorption was supported by Mahajan and Walker [1971] who measured water adsorption isotherms on previously dried coals. They showed that unlike methane adsorption, water adsorption is specific with adsorption occurring first at oxygen functional sites and subsequently on the water "islands" which form. Joubert and co-workers [1973] concluded that additional water above the critical moisture content did not affect methane uptake since this additional water was not adsorbed but condensing in the pores.

IV.1.c Multicomponent adsorption

As described above for methane and water, coalbed methane storage is basically a competition for adsorption be-

tween the various components of the gas. Since water has the lowest saturation pressure of the various major gas components, it has the greatest potential to adsorb. The capacity to adsorb any single component depends on all of the gases/vapors present. Ruppel and coworkers [1972] measured adsorption of methane and ethane on dry coals and theoretically predicted the behavior of mixtures. More recently, Arri and coworkers [1992] have measured multicomponent adsorption (methane/nitrogen, methane/carbon dioxide) on wet coals. They found that at a given pressure and temperature, the presence of nitrogen or carbon dioxide resulted in lower methane adsorption. The effect of the various components could be described by a multicomponent Langmuir isotherm which provides further evidence that the adsorption of methane is purely a physical adsorption process.

IV.1.d Effect of adsorption on coal

Whenever a gas adsorbs or desorbs in a porous material, it introduces some macroscopic and reversible changes. These are primarily the result of release of capillary forces associated with removal of menisci during drying/desorption, which for wetting fluids, cause considerable internal stress. The capillary pressure is inversely proportional to pore size and in small mesopores, the magnitude of capillary pressure may exceed 10,000 psia. This phenomena is commonly observed in drying of porous materials and leads to macroscopic shrinkage. The magnitude of the shrinkage during drying/desorption depends upon the bulk modulus (strength) of the solid matrix. Macroscopic changes in a solid can also occur if the pore fluid exhibits significant hydrogen bonding with the coal matrix. However, during coalbed methane production from a coal seam, the micropores will not dry out and the coal will retain much of its residual moisture. Thus shrinkage due to either capilllary pressure-induced shrinkage or hydrogen bonding effects will be negligible.

IV.2 Migration

The retention and migration of coalbed methane are intimately related. Coalbed methane is produced by drilling a well and lowering the formation pressure at the wellbore. As in conventional natural gas formation, a pressure gradient drives the gas to the wellbore. In Curl's IEA review [1978], he notes that "only methane in the free gas state can flow." As free gas and water flow occur to the wellbore, the formation pressure is lowered allowing gas to desorb from the surface and to leave the dissolved state in the water. Since flow in coal formation is dominated by flow in the fractures, as it is in many low permeability formations, gas production rates are low until the water content of the fracture is lowered. This results in a much higher relativve permeability and hence, higher gas production rates (see Dullien, [1979]). However, because of the great affinity (both adsorption and capillary pressure related), water is never removed from the microporosity of the coal during coalbed methane production. As formation pressures continue to drop, more gas is desorbed and comes out of the dissolved state. The relativve fractions of these three states at the initial reservoir conditions will affect the gas production rate history.

During production, as in a virgin coal seam, molecules of water and gas continually move. This may be the result of two different mechanisms, convection and diffusion. If a pressure gradient exists in a given direction through the seam, water flow will occur just as ordinary ground water is continually moving through the ground. As the water moves, pockets of free gas and dissolved gas will also move. Since the interchange between the free gas, adsorbed gas, and dissolved gas is rapid as compared to these water velocities, molecules of all three gas states move via this process. This transport via a pressure gradient is referred to as convection. Even in the absence of a pressure gradient, water and gas molecules will be continually moving as a result of Brownian motion or diffu-

sion. Gas and liquid molecules are not fixed in space but are always moving. This causes the constant and rapid interchange of gas molecules between free gas, adsorbed gas, and dissolved gas. When additional methane is generated from the coal, this methane becomes a part of the entire system. Thus, there is a constant exchange and replenishment of newly generated molecules with those already present in the system. Also, individual water molecules in the fractures are always exchanging with water in the macroporosity, mesoporosity, and microporosity.

VI. Responses to Specific Questions

VI.1 Discussion of Coal Structure

In recent years, a model of the basic chemical structure of coal has been proposed which is visualized as a three-dimensional, cross-linked macromolecular network referred to as the immobile phase and a second phase composed of smaller molecules which is usually referred to as the "mobile" phase. However, this "mobile" phase is not to be confused with adsorbed molecules. The term mobile is derived not from the ability of the molecules to rapidly move in the coal but rather, the behavior of protons to relax as probed via NMR. This may be taken to be a measure of the "stiffness" of the molecule in which the proton resides. To remove the mobile phase, rigorous conditions such as high temperature (>300°C) and/or extremely polar solvents such as pyridine are required. This removal is a *non-reversible* process in the sense that the immobile and mobile phases cannot be put back together in their original state. In contrast, coalbed methane is readily removed at room temperatuure and can be put back into the coal pore structure (*reversible*). Although the relative proportion of the "mobile" phase is the subject of debate, it is clear that the molecular weight of the "mobile" components is in the range of 100 to 10,000.

This is significantly different than the molecular weight of 16 for methane.

VI.2 Similarities and Differences between Water and Methane

As individual compounds, water and methane are significantly different and this is primarily the result of hydrogen bonding. When a molecule contains hydrogen bonded to either fluorine (F), nitrogen (N), or oxygen (O), hydrogen bonding is important. Hydrogen bonding has strength on the order of 5 kcal/mole and is the reason why water's boiling point is 373 K and methane's is 112 K. Because of hydrogen bonding, water and methane interact in completely different fashion with the coal struture. Methane only physically adsorbs on the coal surface. In contrast, water reacts in several ways. These include bulk water in the fractures and macro/mesopores, physically adsorbed water with specific adsorption on the surface, chemisorption of water, and water hydrogen bonded in the coal structure.

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STATE OF OKLAHOMA)
) ss.
COUNTY OF TULSA)

AFFIDAVIT

Dan Yee, being duly sworn, deposes and says:

1. I have a Ph.D. degree in Engineering Science, and am now and have been for twelve years employed by Amoco Production Company ("Amoco") in its Research Department, Tulsa, Oklahoma. My area of specialization is in the basic and applied research and technological planning and development, of coalbed methane resources. I have published a number of papers in this field. My Curriculum Vitae is attached as Exhibit A.

2. I have been acting as a consultant for counsel in connection with *Southern Ute Indian Tribe v. Amoco Production Company,* Civil Action No. 91-B-2273, United States District Court for the District of Colorado, and have been deposed in that action. A copy of my report entitled "Sorption of Gas in Coal" is attached as Exhibit B.

3. Among other things, I have reviewed portions of the brief submitted by the plaintiff in connection with summary judgment motion, the affidavits of Messrs. Bend, Cooper, Creel, Levine and Marsh furnished with that brief, the reports previously furnished by them to Amoco's counsel, and other materials submitted by plaintiff. I am making this affidavit in partial response to some of the matters and issues raised in those materials.

4. Following this review, I have reached certain conclusions and opinions, which are stated and explained in the following paragraphs.

5. In the plaintiff's brief, there are numerous references to "town" gas and "producer" gas. (Br., pp. 30, 41-42, 55-56). Such gas is completely unlike coalbed gas in most respects.

a. It was not found in the coalseams, but artifically manufactured in coal by inducing chemical reactions by subjecting coal to high temperatures in specially designed equipment.

b. When coal is used to produce such gas, the coal is destroyed. What is left may be tarry residues, coke, or other by products, but the residue is in no sense coal.

c. It is irrelevant whether the coal used as a source material for town gas contained methane or not. The gas product sought and obtained was the result of the breakdown of coal into noncoal products, *not* any residual methane which the coal might have contained.

d. Methane, CH_4, constitutes only a small part of town gas, unlike coalbed gas where methane constitutes a major part. The principal components of town gas were carbon monoxide (CO) and hydrogen (H_2). The BTU content of the typical town gas was far lower than that of typical coalbed gas. Typically town gas has 10-20% of the heating value of natural gas or coalbed gas.

e. The production of town gas is not dependent on coal, and especially not on coal with any particular properties or composition. It can be manufactured from many organic materials, including straw or sawdust.

6. Plaintiff's brief also makes several references to "volatile matter" in coal, and to testing for "volatile matter". (Br., pp. 53-55, 57-60.). However, this "volatile matter" was not the coalbed gas produced by the coalification process over millions of years and found as CH_4 in coal seams. This "volatile matter" is the breakdown product of coal, whereby coal, is broken down under carefully controlled and defined conditions by standard tests, after

exposure to high temperature conditions which would never occur naturally in the coalification process. Gas found in the coal samples, if any, would form a negligible amount of this "volatile matter". The tests for "volatile matter" could be and were performed on coal samples entirely without regard to whether they had come from methane-containing coal deposits.

7. The gas sorbed on coals is measured by an entirely different, and non-destructive, test. This measurement is made by rapidly retrieving coal samples from the formation of interest, placing them in a sealed canister, and measuring the amount of sorbed gas that is released or desorbed. The procedure is the same as allowing the gas to desorb into the atmosphere after mining. The sealed canister simply provides a convenient enclosure to permit the gas to be practically captured and measured. Core or drill cuttings samples are commonly used. As soon as the pressure is reduced, the sorbed gas will begin to desorb and be released into the surroundings as a free gas. The retrieval of the samples must be rapid since a coal sample can easily lose one-quarter to one-half or more of its total gas content in the few minutes and hours that it takes to get to the surface. Fruitland coals from the San Juan basin will typically desorb 25% of its total gas content in just 65 minutes, 50% in 300 minutes, and 90% in 1800 minutes (1.25 days). Virtually all of the gas will be desorbed in less than 7 days.

8. "Rank" is a parameter used to judge the type and nature of coal deposits. The tests for rank do not depend on whether the coal sample under consideration contains or ever contained methane.

9. Plaintiff's brief refers to differences in behavior between sandstone and coal reservoirs which contain natural gas, as being governed, in the sandstone case by Darcy's law of gas movement and in the case of coal by Fick's law of diffusion. However, both laws measure the

movement of gas within a reservoir, and the fact that these laws are applicable at all shows clearly that the gas is separate and distinct from the reservoir matrix itself. Which law applies depends on the characteristic of the matrix not upon the presence or absence of coal. For example, the gas movement and reservoir characteristics in a Devonian shale gas reservoir would be measured by application of Fick's law.

10. The plaintiff's brief, and the expert documentation analogize coalbed gas to water. The analogy is not appropriate.

a. *First,* moisture content is important in the marketing and use of coal for the sample reason that energy expended to evaporate moisture in coal is lost as fuel; therefore the drier the coal the better. Also, water in coal adds materially to costs of shipping coal. By contrast, the methane content of the coal is irrelevant in the coal marketplace.

b. *Second,* definitions of coal often refer explicitly to moisture. No authoritative definition of which I am aware makes any reference to methane.

Third, water is bonded to coal by a different, and much stronger, mechanism (hydrogen bonding), than in methane (bound only by weak Van der Waal forces).

Fourth, even after long exposure to air, water remains in coal, while all or nearly all of the methane is released from coal fairly quickly after exposure.

Dated this 5th day of November, 1993.

/s/ Dan Yee
DAN YEE

[Notary Omitted]

SORPTION OF GAS ON COAL

Dan Yee, Ph.D.
Research Department
Amoco Production Company
Tulsa, Oklahoma

INTRODUCTION

Coal has the ability to sorb gases like other well known sorbents such as silica gels, activated carbons, activated aluminas, and zeolites. Sorption refers to the process by which a gas is held on a surface in a condensed or liquid-like phase. The gas is sorbed on the internal surface area connected with the open microporosity or internal free volume of the solid coal. The following discussion describes the behavior of the gases sorbed on coal.

SUMMARY

1. The sorption of gases on coal is due to a physical sorption process involving weak intermolecular forces. As a result, the following conclusions can be made.

   a. No chemical change occurs upon adsorpton or desorption; and the gas in the free and sorbed states are the same chemically distinct molecules.

   b. The molecules comprising the solid coal are also unchanged, retaining their chemical individuality, so the sorbed gas remains distinct and different from the solid coal material.

   c. There are physical differences between the free and sorbed gas which are analogous to those exhibited by water vapor and liquid water.

   d. The free and sorbed gas molecules exist in a dynamic equilibrium in which there is a constant interchange of molecules between the free and sorbed gas states, so there is not one specific gas

molecule or group of molecules which always reside in either the free or sorbed gas states.

2. On an industry-wide basis, the development and application of methods for measuring and recovering the sorbed gas are consistent with the physical sorption process and analogous to those used for conventional oil and gas reservoirs. Specifically, the following conclusions can be made.

   a. The equilibrium between the free and sorbed gas is given in terms of a reversible sorption isotherm; and in practice, the sorption isotherm has been found represent the gas-in-place and its recovery during simple pressure depletion.

   b. The presence of moisture results in a gas equilibrium among the free, sorbed, and dissolved states similar to that in conventional oil and gas reservoirs.

   c. The sorption of different pure gases and gas mixtures on coal is consistent with the physical sorption process and is analogous to the manner in which these gases behave in conventional oil and gas reservoirs.

3. Amoco Production Company's technology for exploration and production of the sorbed gas further emphasizes the separation of the sorbed gas from the solid coal, as given by the physical sorption process, and the similarity in behavior with the gas in conventional oil and gas reservoirs.

4. Based on the available information, it is my opinion that (1) the sorbed gas and the solid coal remain distinct and different during both adsorption and desorption and (2) the sorbed gas acts, in many ways, similar to the gas in a conventional oil and gas reservoir.

DISCUSSION

The behavior of the sorbed gas is described in terms of the physical sorption process, the equilibrium represented by the sorption isotherm, the recovery due to pressure depletion, and the presence of moisture, different pure gases, and gas mixtures.

Physical Sorption

The sorption process can be classified into two types, physical and chemical. These two types of sorption are sometimes referred to as physisorption and chemisorption, respectively.

The physical sorption process has been described in many works (Brunauer 1943, de Boer 1953, Trapnell 1955, Young and Crowell 1962, Ross and Olivier 1964, Crowell 1966, Gregg and Sing 1967, Gregg and Sing, 1982, Adamson 1990). Physical sorption is a process whereby gas molecules are held close to a surface at a concentration exceeding that of the free gas by weak van der Waals forces. These are not special forces but rather the same ones responsible for the condensation of a gas to a liquid. As such, gas sorption is described as a condensation of the free gas on a surface.

Physical sorption, like condensation, is a general process that occurs with any gas-solid system provided that the pressure and temperature are suitable. Because the forces are weak, the sorbed gas molecules and those of the surface are not chemically altered by the adsorption or desorption process. As a result, the sorbed gas molecules and those of the surface retain their distinct chemical identity. The free gas and sorbed gas consist of the same chemically distinct molecules but differ physically in a manner similar to the differences between water vapor and liquid water. The weak forces also mean that the sorbed gas can be easily removed by nothing more than reducing the free gas pressure.

Further, the free and sorbed gas exist in a dynamic equilibrium. The dynamic equilibrium refers to the constant interchange of the free and sorbed gas molecules, where on average the number of evaporating gas molecules are balanced by an equal number of condensing molecules. A similar situation occurs at every gas-liquid water surface. The typical residence time in the sorbed state is just a fraction of a second for conditions typical of physical sorption (de Boer 1953, Adamson 1990). The sorbed gas molecules are also mobile, having the ability to move about the surface (de Boer 1953).

In contrast to physical sorption, chemical sorption actually involves the formation of a chemical bond between the gas and surface molecules (Brunauer 1943, de Boer 1953, Trapnell 1955, Young and Crowell 1962, Crowell 1966, Gregg and Sing 1967, Adamson 1990). These bonds are ionic or covalent bonds formed between the electrons in the chemical and electronic properties of both the gas and surface molecules. In fact, it is possible for the gas molecule to actually dissociate upon adsorption. Due to these strong bonding forces, it takes much more energy than simple pressure reduction to cause the gas to desorb; and in some cases, a chemically different molecule will desorb from the one which was originally adsorbed. Chemical sorption is also a specific process occurring only between those molecules which can have chemical reaction and, therefore, form a chemical bond.

Based on these differences, several criteria can be used for distinguishing between physical and chemical sorption (Ruthven 1984). Basically, physical sorption has low heats of sorption—less than two to three times the latent heat of vaporization, while chemical sorption has high heats of sorption. In addition, physical sorption is rapid, reversible, and non-specific. Chemical sorption is just the opposite—slow, irreversible, and specific.

Many studies show that gas storage on coal is a physical sorption process. In the case of methane, several works

have shown that the heat of sorption is less than two to three times the heat of vaporization of methane (Zwietering and van Krevelen 1954, Moffat and Weale 1955, van der Sommen et al. 1955, Anderson et al. 1966, Ruppel et al. 1972, Ruppel et al. 1974, Yang and Saunders 1985). This is also true for nitrogen (Zwietering and van Krevelen 1954), hydrogen (Yang and Saunders 1985), and carbon dioxide (Stevenson et al. 1991) which demonstrates that the process is nonspecific. These results are summarized in Table 1.

The rapid attainment of equilibrium refers to the rate of sorption at the surface of a micropore and not to the rate of diffusion as gas moves through the microporous solid coal. Some diffusion is probably occurring in all experimental measurements. Still, equilibrium times of a few hours are very typical (Moffat and Weale 1955, van der Sommen et al. 1955, Jolly et al. 1968) indicating that equilibrium is quite rapid even though some diffusion is taking place.

There is also plenty of evidence that the process is reversible (van der Sommen et al. 1955, Gunther 1965, Daines 1968, Mavor et al. 1990). Reversible means that the adsorption and desorption curves are the same.

Adsorption refers to increasing sorption due to increasing free gas pressure, while desorption refers to decreasing sorption due to decreasing free gas pressure. Still, hysteresis or irreversible behavior has been reported by one study (Bell and Rakop 1986), but a later work (Mavor et al. 1991) found that the hysteresis was caused by experimental errors related to the change of moisture in the coal during measurement. As an example, the reversibility of methane sorption is shown in Figure 1 for a Fruitland coal sample from the San Juan Basin.

The fact that all four of the criteria are satisfied provides very strong evidence that methane and other gases are physically sorbed on coal.

Sorption Isotherm

The equilibrium between a free gas and its sorbed phase is expressed in terms of a sorption isotherm which gives the sorbed gas content as a function of the free gas pressure at a constant temperature. The Langmuir isotherm is commonly used for gas sorption on coal as well as many industrial and commercial sorbents. It is based upon a dynamic equilibrium between evaporation and condensation and is commonly determined from laboratory measured sorption data.

The production of sorbed gas involves a pressure reduction or desorption which is caused by a removal of gas and water from a coal seam. For a given pressure reduction, an amount of sorbed gas specified by the Langmuir isotherm is desorbed and becomes [Illegible] Verification of this process is given by laboratory experiments and demonstrations, by desorption of gas from field core samples, by downhole Treasures in producing wells, and by the gas rates and recovery from coal seams. This evidence reinforces that the sorbed gas is recoverd by nothing more than simple pressure depletion, and this pressure behavior of the sorbtion gas is totally consistent with the principles of physical sorption. Further, the Langmuir isotherm is used in a manner totally analogous to the way in which the real gas law is used for a conventional gas reservoir.

Moisture

In addition to sorbed gas, water moisture is also sorbed in the open microporosity or internal free volume of solid coal (Berkowitz, 1979). The sorbed water reduces the sorption of methane relative to the amount which could be sorbed on dry coal (Selden 1934, Gunther 1965, Daines 1968, Jolly et al. 1968, Patching 1970, Bell and Rakop 1986, Patching and Mikhal 1986, Mavor et al. 1990). At in situ conditions, coal is fully sorbed with water so the effect of moisture has already been realized.

The main implication is that laboratory measurements of gas sorption should use coal samples containing the sorbed moisture in order to be representative of in situ conditions (Joubert 1973, Joubert 1974).

Coals also contain water in a bulk form in the larger pores and natural fractures (Berkowitz, 1979). With the presence of bulk water, the equilibrium actually takes place among the gas dissolved or absorbed in the bulk water, the free gas, and the sorbed gas. When there is no free gas present, the equilibrium is just between the dissolved and sorbed gas states. The equilibrium between the gas dissolved or absorbed in the bulk water and the free gas is commonly given in terms of Henry's Law.

The presence of water is not unusual, since all conventional oil and gas reservoirs contain water (Levorsen 1967). In fact, gas sorption also occurs on the rocks of conventional oil and gas reservoirs, though to a much lesser degree than on coal. As a result, the same gas equilibrium among the dissolved, free, and sorbed states exists in all conventional oil and gas reservoirs.

Different Pure Gases

It is well known that different pure gases have different sorption capacities on coal (Gunther 1965, Patching 1970, Yang and Saunders 1985, Stevenson et al. 1991, Arri et al. 1992). As an example, the results for nitrogen, methane, and carbon dioxide are shown in Figure 2 for a Fruitland coal sample from the San Juan Basin. For common gases, the trend of increasing sorption capacity is hydrogen, nitrogen, methane, ethane, and carbon dioxide. This order is also one of increasing atmospheric pressure boiling point which provides further evidence that physical sorption is occurring. Physical sorption is governed by the same forces responsible for condensation of a gas to a liquid, and each pure gas has a different propensity for condensation or vaporization. This propensity is illustrated by the value of the atmospheric pressure boiling

point. Increasing boiling point means that more energy is required to cause vaporization indicating an increased preference for condensation and, therefore, a greater sorption capacity (Brunauer 1943, Ettinger et al. 1966). This difference in sorption capacity is not unique to coal, since these pure gases dissolve in the the oil of a conventional reservoir follow the same trend (Standing, 1951, Muskat, 1981).

Gas Mixtures

Like the gas in conventional reservoirs, the gas sorbed on coal is not always pure methane (Creedy and Pritchard 1983, Gould et al. 1987, Hanson 1990). In some cases, the coal contains appreciable amounts of carbon dioxide, nitrogen, and heavier hydrocarbons; and the composition of the gas sorbed on coal and that of the gas to conventional reservoirs can be quite similar. Further, the composition of gas in coal seams can be vary from location to location, as does the gas in conventional reservoirs (Scott et al. 1991).

The sorption of gas mixture on coal is consistent with the physical sorption process. As such, the behavior of sorbed gas mixtures is readily described using multicomponent models of physical sorption (Ruppel et al. 1972, Saunders et al. 1985, Stevenson et al. 1991, DeGance et al. 1992). The extended Langmuir isotherm is one of these models, and an example is shown in Figure 3 for methane-nitrogen sorption on a Fruitland coal sample from the San Juan Basin.

The difference in pure gas sorption capacities suggests that the less strongly sorbed methane might be produced in preference to the more strongly sorbed carbon dioxide and heavier hydrocarbons. Production data and reservoir modeling results suggest that the magnitude of the gas composition changes is small due to the limited pressure range over which depletion usually occurs (Hale and Firth 1988, Decker et al. 1988, Yee et al. 1991). These results

are similar to the behavior of the produced gas composition for a conventional gas condensate reservoir (Standing 1951, Muskat 1981).

Amoco Production Company's Technology

The principles and practices encompassed in Amoco Production Company's technology is consistent with that developed and used on an industry-wide basis. As such, it further reinforces (1) the separation of the sorbed gas from the solid coal, consistent with the principles of the physical sorption process, and (2) the similarity of the gas sorbed on coal with the gas in conventional oil and gas reservoirs. Specifically, Amoco Production Company's technology includes studies on the sorption of pure gases and their mixtures (Arri et al. 1992, DeGance et al. 1992, Yee et al. 1991, Yee et al. 1992), the modeling of gas storage and production (Seidle and Arri 1990, Seidle 1991, Yee et al. 1991), the measurement of coal seam permeability (Seidle et al. 1991), the enhanced recovery of sorbed gas (Puri and Yee 1990, Arri et al. 1992), and the use of coal seams for gas storage (Puri and Volz 1992). Many of these results are also presented in a summary of Amoco Production Company's research effort (Metcalfe et al. 1991).

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4-007

Application No. 3422

HOMESTEAD

Land Office at Durango, Colorado.

February 17th, 1906.

I, JOHN J. PATTERSON, *of* Durango, La Plata County, Colorado, *do hereby apply to enter, under Section 2289, Revised Statutes of the United States, the* E.½ SE.¼ Sec. 21 and the W.SW.¼ *of Section 22, in Township* 34 North *of Range* 9 W.N.M.P.M., *containing 160 acres.*

/s/ John J. Patterson

Land Office at Durango, Colorado

February 17th, 1906.

I, F.C. Perkins, REGISTER OF THE LAND OFFICE, do hereby certify that the above application is for Surveyed Lands of the class which the applicant is legally entitled to enter under Section 2289, Revised Statutes of the United States, and that there is no prior valid adverse right to the same.

/s/ F.C. Perkins
Register.

Favorable Report of
Charles W. Wells, Special Examiner,
in re H.E. No. 3422, Durango series,
John J. Patterson, Durango.

DEPARTMENT OF THE INTERIOR

GENERAL LAND OFFICE

Denver, Colorado, July 6th, 1908.

Honorable Commissioner,

General Land Office,

Washington, D. C.

Sir:—

Refering to your letter "P. 'A.F. McC,'" of June 14th, 1907, in which certain lands within withdrawn coal land areas, were sent to Division "P." for investigation, I have the honor to inform you that H.E. No. 3422, Durango series, F.C. No. 1108, John J. Patterson, Entryman, E.½ S.E.¼ Sec. 21, the W.½ of the S.W.¼ of Sec. 22, T.34 N. R.9 W. of the N.M.P.M. is included within the list of such entries.

On June 16th, 1908 I made an examination on the ground of the entry and beg leave to report as follows:—

The two groups of coal measures or veins common to this locality, each underlie this entry, the Laramie group of veins at a probable depth of from 1200 to 1500 feet below the surface, the saverda group of veins at a probable depth of 3200 to 4000 feet below the surface of the entry. The nearest exposed outcropping to the entry is on the N.W.¼ of Sec. 4, T.34 N.E.9 W. of the N.M.P.M it is across the Animas river from the entry, about 5 miles from the N.W. Cor. of the entry.

The entry is on a high mesa known as the lower Florida mesa, it can all be irrigated, and lies level and can all be

cultivated, the surface is covered with scrub pinon and cedar, and sage brush. About 20 acres has been cleared and is under cultivation at the present time, the entry is used by the entryman as a home, whose improvements are good, all the surroundings show good faith as being exhibited by the entryman, and go to show that he took the land for a home and not for and in the interest of anyone for the coal that underlies the land.

Owing to the great depth of the coal on this entry, and the long distance from any outcrop opening, it will be a great many years before this land will have any special value for the coal underlying it, and I do not think that the entryman took the land for any other purpose than that set out in his brief, being that of wanting it for a home.

I would recommend that the protest be withdrawn and providing the other evidence offered is sufficient, that the entry be allowed to proceed to patent.

Very Respectfully

/s/ Charles W. Wells
Special Examiner S.L.S.

Chief Field Div. M.D. McEniry.

Relative to favorable reports by Spl. Examiner Wells on agricultural entries in Tps. withdrawn as coal lands in Durango District.

DEPARTMENT OF THE INTERIOR
GENERAL LAND OFFICE

522 Quincy Bldg.,

Denver, Colo., July 31, 1908.

Honorable Commissioner,

General Land Office,

Washington, D. C.

During the first two weeks of this month Special Coal Examiner Charles W. Wells made thirty-two favorable reports on homestead and desert land entries in the Durango Land District, embracing lands situated on what are known as the Florida and Fort Lewis Mesas, south and southwest of the city of Durango.

The townships in which these lands are located have been withdrawn, and Tp. 34 N.½ R. 8 W., N.M.P.M., in which most of the entries referred to above are located, has been classified, as coal land. In the cases investigated, a list of which, with the entry numbers and descriptions of the lands, is appended hereto, the entrymen have made full compliance with the law as to residence and improvements, where the lands were taken up under the homestead act; where taken under the desert land law, the land has been reclaimed, and a large part of it is in cultivation. In many instances, the desert land claimants are actually residing and making their homes on the land.

These mesas are all underlaid with coal, and comprise part of the area known as the Durango coal fields. These

coal fields have been so thoroughly examined geologically, and prospected so much from a practical standpoint, that the coal areas have been established beyond peradventure. In one of his adverse reports, in describing this field, Special Examiner Wells states,

> "It has been fully determined and satisfactorily proven that wherever you find escarpments of the two coal measures, namely, the Mesaverde and Laramie measures, between the two escarpments you will find the Lewis shale, and below the Lewis shale you will find the Mesaverde coal measures at all places; that stratigraphically there is from 2000 to 2400 feet between the two coal measures; that the depth of the coal measures at any point between the escarpments will depend on the amount of distance stratigraphically that the point is below the bottom of the Laramie measure.
>
> "These facts are not only known to those familiar with the geology of the Durango field, but have become the common property of all."

I have been over part of these lands myself; and Special Agent Scott, now Chief fo the 11th Field Division, made a number of examinations of claims on this mesa, prior to his leaving here. His reports were along the same line as Special Examiner Wells', recommending the issuance of final certificate. In all of those reports I concurred in the recommendations.

The question naturally arises, however, as to where to draw the line between the bona fides of an entryman, as shown in these cases submitted, and the interests of the Government, in the enforcement of the law in holding lands exclusively for their coal values. In these cases we all believe that the entrymen took up the lands solely for agricultural purposes, with no thought of the coal values—at least, no thought of any present coal value of the land. When the time will come when the coal underlying these lands will be commercially valuable, in the sense that a ready market will be at hand for it, is problematic. Undoubtedly it will be at least ten, and perhaps thirty or forty years, before the Durango field will be worked to the extent that the Trinidad coal fields of this state are being worked at the present time.

At the same time, as stated before, there is no question that these lands are underlaid with valuable coal measures, and they lie at such a depth that they could be worked with profit at the present time. As stated in our reports on these entries, in a general way, I believe all the equities in the case seem to give the entrymen the perference and to insure him his title, by reason of what he has done to the surface of the land.

I do not feel satisfied, however, in recommending that these entries pass to patent on these favorable reports, even while endorsing the recommendations of the agents making the field investigations, without calling your particular attention to the entire group of cases, and presenting the cases in a more concrete form than the several reports referred to have done.

There will probably be quite a number of similar cases to be reported on in the future; and if consistent with the policy of the office, I respectfully request an expression from you on the recommendations made in the cases a list of which is attached hereto.

Very respectfully,

/s/ M. D. McEniry
Chief Field Division.

[List of Entries on Florida and
Fort Lewis Mesas Omitted]

September 9, 1908.

Honorable Commissioner:

This is a very difficult matter to determine in view of the strong equities of the homestead and desert entrymen who have possibly innocently spent their time and money in improving and developing these lands. At the same time I do not see how we are justified in passing the entries to patent in view of the statement made by Chief of Field Division McEniry and Examiner Wells, that these mesas are underlayed with coal, and their coal character has been so thoroughly established by expert examination and prospecting as to be commonly known in the vicinity. It is not necessary, as it contended on page 5 of the letter, that claimants should have personally known of the existence of the coal in order to preclude the disposition of the lands to them under the agricultural laws. If the coal character was a matter of common knowledge or was such that it was incumbent upon the entrymen to know it, it matters not whether they had actual knowledge of its existence or not, nor can we be governed by the statement that the coal at present has no market value because if the land does contain valuable deposits of coal it is not subject to disposition under other laws no matter what would be the distance from the market. The Department has so ruled in a timber and stone case, 34 L. D. 123.

I am inclined to think that we will have to proceed against the entries but hope that before final action shall have been taken thereon, Congress will have passed a bill which will enable us to dispose of the surface to the entrymen, reserved.

/s/ [Illegible]
Law Clerk

DEPARTMENT OF THE INTERIOR
GENERAL LAND OFFICE.
WASHINGTON, D. C.

Sept. 22, 1908.

Reports submitted [Illegible] warrant
adverse proceedings

Mr. M. D. McEniry,

Chief of Field Division,

Denver, Colorado.

Sir:

The office is in receipt of your report dated July 31, 1908, in which you draw attention to 32 favorable reports made by special Examiner Charles W. Wells, during the early part of July, on homestead and desert land entries in the Durango land district, embracing lands situated on what are known as the Florida and the Ft. Lewis mesas. You state that the townships in which these lands are located have been withdrawn and township 34 N., R. 8 W., N. M. P. M., in which 6 of the entries referred to are located, has been classified as coal in character. You append a list of the entries reported upon by Examiner Wells, and state that the entrymen have made full compliance with the law as to residence and improvements, where the lands were taken up under the homestead act, and where taken up under the desert-land law, the land has been reclaimed and a large part of it in cultivation, and that many of the desert-land claimant are actually residing and making their homes on the land.

These mesas, you state, are all underlaid with coal, and comprise part of what is known as the Durango coal field; that these coal fields have been so thoroughly examined, geologically, and prospected so thoroughly, from a practical standpoint, that the coal areas have been established

beyond peradventure. You quote from an adverse report made by Examiner Wells, in describing this field as follows:

> "It has been fully determined and satisfactorily proved that wherever you find escarpements of the two coal measures, namely, the Mesaverde and the Larimer measures, between the two escarpements, you will find the Lewis shale, and below the Lewis shale you will find the Mesaverde coal measures at all places; that, stratigraphically, there is from 2000 feet to 2400 feet between the two coal measures; that the depth of the coal measures at any point between the escarpements, will depend upon the amount of distance, stratigraphically, that the point is below the bottom of the Larimer measures. These facts are not only known to those familiar with the geology of the Durango field, but have become the common property of all."

You state that you have been over part of these lands yourself; and that Special Agent Scott (new chief of the 11th field division), made a number of examinations of the claims on this mesa, prior to his leaving Colorado, and that his reports were along the same lines as Special Examiner Wells, recommending the issuance of final certificate, and that in all of these reports you concurred in the recommendation.

You request to be informed as to where to draw the line between the bona fides of an entryman, as shown in these cases submitted, and the interests of the government in the enforcement of the law in holding lands exclusively for their coal values. You state that in these cases you fully believe that the entryman took up the land solely for agricultural purposes, with no thought of the coal value, at least as thought of any present coal value of the land; that when the time will come when the coal underlying these lands will be commercially valuable in the sense that a ready market will be at hand for it, is

problematic, and that it undoubtedly will be at least 10, and perhaps 30 or 40 years before this Durango field will be worked to the extent that the Trinidad coal field is being worked at the present time.

You further add that you do not feel satisfied in recommending that these entries pass to patent on these favorable reports, even while endorsing the recommendations of the agent making the field investigations, without calling particular attention to the entire group of cases, and presenting the cases in a more concrete form than the several reports referred to have done.

All of the entires enumerated in the list accompanying your report have been drawn to this division and a careful examination has been made of them, and of the reports submitted upon them by Special Examiner Wells. It is observed that, in story, the final certificate has issued or final proof has been submitted.

A fair sample of the reports submitted by Examiner Wells in these cases is his report, dated July 13, 1908, cash entry No. 2:13, of John F. McCoy, Vincent, Colorado, embracing the E. ½ of SW. ¼, Sec. 10; E. ½ W. ¼, Sec. 15; L. 34 N, [Illegible] 12 ¼., N. M. P. M., wherein he states that the lower measures of the coal veins common to the locality underlie this entry at a probable depth of from 150 to 300 feet; that the nearest outcropping to the north appears near the center of Sec. 34, T. 35 N., R. 12 W., —a distance of 4 miles; the nearest outcropping to the northwest, is in the NE. 1, Sec. 5, T. 34 N., R. 12 W., —a distance of 6 miles; that there is also an outcropping 6 miles southeast from the entry; that this entry is on the formation known as the Lewis shale; and there is nothing on or in the vicinity of it that would indicate to a layman that it was above coal measures.

His report further shows that the principal part of the land was covered, originally, with a very rank growth of sage brush; that the portion extending under the slope of

a hill is covered with a scrubby growth of cedar, and a few scrub pinion pines; that the improvements consist of a farm house worth from $500 to $600; milk house and cellar, rock, worth $100, a grain house worth $50; together with a good stable and corrals; 100 acres is enclosed with a hog tight-wire fence; fifty acres are under for cultivation, plenty of water has been secured to irrigate all the tillable land. A good system of ditches has been constructed to place water on the land suitable for cultivation; the land suitable for cultivation is of a very high-class bottom sage brush land; and the agent considers the entire entry, with the improvements and water rights, to be worth in the neighborhood of $5000; which is practically $50 per acre. The agent adds that he considers that the law pertaining to homestead entries has been fully complied with, and that entryman took the land for a home for himself and family.

The field examinations in these cases were made after the claimants had offered their final proofs, but the facts reported by the special agent existed and were known to exist at and prior to submission of final proof. It is not a question as to whether entryman had actual notice of the existence of coal or not, nor is it necessary to show that the government or its agent had, prior to final proof, actual knowledge of the existence of this deposit. The rule is that if the valuable mineral or coal is known to exist, the land is not subject to agricultural disposition; as, for instance, it may be known to a contestant who may establish that fact by means of proof, and thus secure the cancellation of the entry, although the entryman may have no actual knowledge of its existence or it may be as in these cases, i. e., the geological formation of the land involved and the surrounding lands, and discoveries and developments upon other in the locality, are such as to charge people generally with a knowledge of the coal character thereof, although a particular entryman might not have had actual knowledge of these conditions.

It was a matter of common knowledge with which these entrymen must be presumed to be charged. Any other holding than this would render the government powerless to control the proper disposition of its lands, and it should not have imposed upon it the burden of bringing to every claimant who enters upon public lands, actual knowledge as to their character.

This geological condition existed prior to the original settlement upon these land; and it is, therefore, not a question of discoveries made after final proof, but is simply the estabilshing by proof of the fact that this condition existed prior to proof.

The reports in these cases, establishing the coal character of the tracts, warrant adverse proceedings against the entries. Each case will be taken up in due course of business and proceedings directed charging the lands to be coal in character and known to be such at and before the submission of proof.

Very respectfully,

/s/ [Illegible]
Commissioner.

DEPARTMENT OF THE INTERIOR

NOTICE OF RIGHT OF ELECTION
(Act March 3, 1909)

U. S. LAND OFFICE, No. 02072

May 17, 1909.

John J. Patterson,
Durango, Colorado.

Sir:

Your attention is directed to the provisions of the Act of March 3, 1909, on the back hereof, and you are hereby allowed sixty days from notice within which to file in this office your election to take patent for the lands embraced in your location, selection, or entry, Number 3422, made July 2, 1906, for E½SE¼ Sec. 21, and W½SW¼, Section 22, Township 34N, Range 9 W, New Mexico Principal Meridian, such patent to reserve to the United States all coal in the lands with the right of the United States, or persons authorized by it, to prospect for, mine, and remove coal from the same upon compliance with the conditions of and subject to the limitations of said act; or to deny the existence of known deposits of valuable coal upon the land at date of final proof and entry, in which event you must file in this office within the time prescribed, evidence in the form of affidavit statements by persons familiar with the lands, preferably mineral experts or practical miners, alleging the lands to be noncoal in character, with the reasons therefor. If you fail to within sixty days from receipt of this notice file your said election, or to deny the existence of known deposits of valuable coal in the land, patent will issue on submission of final

proof satisfactory in other respects, reserving to the United States all the coal in the land.

Respectfully,

/s/ G. H. Charlton, Register

/s/ D. H. Sheets, Receiver

Election to Receive Patent upon Nonmineral Claim Exclusive of any Deposits of Coal in the Land.

State of Colorado)
) ss:
County of La Plata)

County of La Plata, State of Colorado

[Illegible]

No. 3422, for the E½SE¼ Sec. 21, and W½SW¼, Section 22, Township 34 N, Range 9 W, New Mexico Principal Meridian, being duly sworn, do hereby ELECT, upon submission of satisfactory proof of compliance with law under which my claim was initiated, to receive patent for the lands, which patent shall reserve to the United States all of the coal in said lands with the right of the United States, or any person authorized by it, to prospect for, mine, and remove the coal from same in accordance with the conditions and limitations of the Act of March 3, 1909, Public No. 323.

In accordance with above election, I hereby authorize the proper officer or officers of the United States, upon submission of satisfactory final proof upon my location, selection, or entry, to issue final certificate or other paper as basis for patent, containing the reservation of the coal hereinbefore described, and to issue patent in accordance therewith.

/s/ John J. Patterson

I HEREBY CERTIFY that the foregoing affidavit was read to or by affiant in my presence before affiant affixed signature thereto; that affiant is to me personally (known or has been satisfactorily identified before me by .....);

(Give full name and post-office address)

and that said affidavit was duly subscribed and sworn to before me at my office in Durango, Colorado, this tenth day of May, 1909.

/s/ G. H. Charlton, Register
(official description of officer)

Note 1. This affidavit of election may be executed before any officer authorized to administer oaths and possessesed of a seal.

Note 2. The attention of parties in interest is directed to the provisions of the Act of March 3, 1909, copy of which is printed below.

[PUBLIC—No. 323]
[H. R. 24834]

An Act For the protection of the surface rights of entryman.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That any person who has in good faith located, selected, or entered under the nonmineral land laws of the United States any lands which subsequently are classified, claimed, or reported as being valuable for coal, may, if he shall so elect, and upon making satisfactory proof of compliance with the laws under which such lands are claimed, receive a patent therefor, which shall contain a reservation to the United States of all coal in said lands, and the right to prospect for, mine, and remove the same. The coal deposits in such lands shall be subject to disposal by the United States in accordance with the provisions of the coal-land laws in force at the time of such disposal, but no person shall enter upon said lands to prospect for, or mine and remove coal therefrom, without previous consent of the owner under such patent, except upon such conditions as to security for and payment of all damages to such owner caused thereby as may be determined by a court of competent jurisdiction: *Provided,* That the owner under such patent shall have the right to mine coal for use on the land for domestic purposes prior to the disposal by the United States of the coal deposit: *Provided further,* That nothing herein contained shall be held to affect or abridge the right of any locator, selector, or entryman to a hearing for the purpose of determining the character of the land located, selected, or entered by him. Such locator, selector or entryman who has heretofore made or shall hereafter make final proof showing good faith and satisfactory compliance with the law under which his land is claimed shall be entitled to a patent without reservation unless at the time of such final proof and entry it shall be shown that the land is chiefly valuable for coal.

Approved March 3, 1909.

Durango H.E. 3422

DEPARTMENT OF THE INTERIOR,
GENERAL LAND OFFICE,
Washington, D.C. June 30, 1909

Register and Receiver

Durango, Colorado

Sir:

On July 2, 1906, John J. Patterson made H.E. 3422, your services for the E½SE¼ Sec.21 and W½SW¼ Sec.22, T.34 N., R. 9 W., E.M.T.M., upon which homestead final certificate No. 1103 issued March 22, 1907. The entryman, on December 7, 1901, made H.E. 2372 for the same lands, and this second H.E.—No. 3422—was allowed by letter "I" of May 18, 1906. This township has been withdrawn on that land but not classified.

On July 6, 1908, Special Examiner Charles W. Wells submitted a report in this case, alleging that the land contains workable beds of coal.

Since it appears that the entryman has complied with the homestead laws as to residence and cultivation, and that the value of the land for its coal contents is the only charge against the entry, you are directed to notify entryman that he will be allowed 50 days from notice within which to file in your office his electing to take patent for the land exclusive of the coal deposits contained therein, or to deny that the land contains work-pile deposits of coal and request hearing to determine that question. You will issue such notice and proceed with the case in accordance with the provisions of the Act of March 3, 1909, and the instructions [Illegible] of March 25, 1909. (See also circular of April 27, 1909.)

The record appears satisfactory and complete. If entryman shall elect to take patent for the land reserving all the coal contained therein to the United States, or if, after

having actually received notice, he shall fail to take any action, the entry will be passed to patent, said patent containing reservation, conditions and limitations of the act of March 3, 1909 (Public No. 323).

In due time submit report to this office.

Very respectfully,

/s/ Fred Damnett
Commissioner.

WWG

(Copy to Chief F.D.)

4-400-1yr.

THE UNITED STATES OF AMERICA
(RECORD OF PATENT)

TO ALL WHOM THESE PRESENTS SHALL COME.
GREETING:

Durango 02072.

Homestead Certificate No.

Application

WHEREAS, There has been deposited in the GENERAL LAND OFFICE of the United States a Certificate of the Register or the Land Office at Durango, Colorado, whereby it appears that, pursuant to the Act of Congress approved 20th May, 1862, "To secure Homesteads to Actual Settlers on the Public Domain," and the acts supplemental thereto, the claim of

JOHN J. PATTERSON

has been established and duly consummated, in conformity to law, for the east half of the southeast quarter of Section twenty-one and the west half of the southwest quarter of Section twenty-two in Township thirty-four north of Range nine west of the New Mexico Meridian, Colorado, containing one hundred sixty acres, according to the Official Plat of the Survey of the said Land, returned to the GENERAL LAND OFFICE by the Surveyor General:

NOW KNOW YE, That there is, therefore, granted by the UNITED STATES unto the said John J. Patterson the tract of Land above described: TO HAVE AND TO HOLD the said tract of Land, with the appurtenances thereof, unto the said John J. Patterson and to his heirs and assigns forever; subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used

in connection with such water rights, as may be recognized and acknowledged by the local customs, laws, and decisions of courts, and also subject to the right of the proprietor of a vein or lode to extract and remove his ore therefrom, should the same be found to penetrate or intersect the premises hereby granted, as provided by law. And there is reserved from the lands hereby granted, a right of way thereon for ditches or canals constructed by the authority of the United States.

Reserving, however, to the United States all coal in the lands so entered, and to it, or persons authorized by it, the right to prospect for, mine, and remove coal from the same upon compliance with the conditions of and subject to the limitations of the Act of March 3, 1909 (Public No. 323).

IN TESTIMONY WHEREOF, I, William H. Taft, President of the United States of America, have caused these letters to be made Patent, and the seal of the General Land Office to be hereunto affixed.

[Seal]

GIVEN under my hand, at the City of Washington, the Sixth day of DECEMBER, in the year of our Lord, one thousand nine hundred and nine, and of the Independence of the United States the one hundred and THIRTY-FOURTH.

By the President:

/s/ Wm. H. Taft

By /s/ M. W. Young
Secretary.

/s/ [Illegible]
Recorder of the
General Land Office.

IN THE UNITED STATES DISTRICT COURT
DISTRICT OF COLORADO

Case No. 91-B-2273

SOUTHERN UTE INDIAN TRIBE,
Plaintiff,

v.

AMOCO PRODUCTION COMPANY, *et al.*,
Defendants.

AFFIDAVIT OF STEPHEN L. BEND

Stephen L. Bend, being duly sworn, deposes and says:

1.1 My name is Stephen L. Bend. I am employed by the University of Regina, Canada, as an assistant professor and research scientist in the Department of Geology. I reside at 146 Laubach Crescent, Regina, Saskatchewan, Canada.

1.2 I am an organic geochemist and an organic petrologist. I possess a wide range of skills within these two related disciplines, coupled with a range of interests that extend from basin evaluation, the characterization of petroleum source materials and related products, to various aspects of coal science. I have a PhD and MSc specifically related to these areas.

1.3 I have previously been employed as an organic geochemist by Exploration Logging Canada. In addition, I have been a petroleum logging geologist for Exploration Logging Overseas, Ltd. A copy of my resume is attached as Exhibit 1.

1.4 I have been retained by the Southern Ute Indian Tribe to describe the aspects of coal composition, formation and characterization, as related to the mode of occurrence of coalbed methane.

2.1 Coal has remained a significant industrial and economic commodity for hundreds of years, both as a fuel and as an industrial feedstock. Coal is a multi-purpose resource that has many uses besides being burned as a solid fuel.

2.2 Coal represents an easily recognizable natural substance, however it is not homogeneous.

2.3 Coal can vary greatly in its properties and suitability for a given application. The chemical and physical properties of coal are also highly variable.

2.4 Coal is a complex heterogeneous material and a system of associated entities.

2.5. Coal is a heterogeneous carbonaceous substance comprised of macerals, water, gases, oil-like bitumen, elements and trace elements. Coal contains constituents that are clearly not solid (i.e., liquids, gases), it also contains materials that exhibit a fluid-like or plastic behavior (e.g. bitumen, the maceral exudatinite) under normal geological conditions, and material (e.g. calcium, sodium) that may be exchanged.

2.6 Coal as an entity is a sedimentary rock, unlike kerogen which represents relatively minor amounts of organic material disseminated throughout a host rock. The relative proportion of organic to inorganic material differentiates what is coal as an economic entity and what is organic-rich carbonate or clastic rock.

3.1 The formation of coal occurs over many millions of years. The process commences with the formation, accumulation and preservation of plant and organic material in an aquatic environment. Upon death, such plant and organic material may be partially or completely decomposed and incorporated within peat.

3.2 Coal is derived from peat. Peat has long been recognized as the principal precursor of all humic coals.

Peat is largely comprised of water. It is not possible to have a complete and meaningful definition of peat without reference to its moisture content. Peat represents the culmination of organic detritus, formed predominantly from plant material, with minor amounts of inorganic mineral material. Many inherent properties within coal (e.g. maceral composition) are ultimately derived from the processes that take place during the formation of peat, and therefore peat is the starting point of coal.

3.3 The accumulation of peat in a gently subsiding aquatic environment is considered a necessary prerequisite to the formation of coal. The development of a peat-forming environment requires unique conditions. Peat forming environments generally are referred to as swamps, mires, or marshes, including all those water-logged environments that form a habitat for aborescent and herbaceous plant species in which there is a net accumulation of organic plant detritus. There are two models that are currently considered to represent a peat-forming environment, they are the "delta" and the "raised ombrogeneous bog." These models share two important features that render them distinct from the laccustrine or marine depositional environments that are typically associated with the accumulation of potential petroleum source rocks. Firstly, humic coals are deposited within an oxic to suboxic environment, whereas the deposition of kerogen precursor material requires a suboxic to anoxic environment. The circulation of oxygen bearing water through a fine-grained sediment that contains disseminated organic matter effectively promotes the degradation and removal of that organic material by scavenging organisms. Second, coal is formed *insitu* predominantly from autochthonous material, whereas the formation and accumulation of petroleum in exploitable amounts typically involves the migration of material from a fine-grained clastic source rock to the reservoir.

3.4 Coalification represents the natural chemical and physical transformation of peat into coal, firstly by the

biochemical processes of peatification, and subsequently by geochemical processes over geological time (i.e. millions of years).

4. *Coal Macerals.* The internationally recognized terms for the three coal maceral groups are vitrinite, liptinite (exinite) and inertinite. Their respective macerals and origins are given in Table A.

4.1 The vitrinite group includes those microscopically distinct entities that correspond to the macroscopic bright bands in a hand specimen of coal (i.e. vitrain), and represents the predominant macerals in coal, those which form the coal matrix. The vitrinite group includes those macerals that are considered to have been derived from the humins of trunks, branches, stems, leaves and roots of vascular plants. The maceral telenite, for example, is identified on the basis of morphology (i.e. cell-structure) and color in reflected light.

4.2 Liptinites are largely grouped on the basis of specific optical and chemical properties (e.g. auto-fluorescence, a high hydrogen and low oxygen content) rather than origin. Some liptinites represent the "exines" of plant organs, some represent the bodies of once living algae, and some liptinites are generated during the process of coalification and do not exist within either peat or lignite. Exudatinite represent the movement and concentration of newly generated material within the cleats and cracks of coal, whereas fluorinite represents small blebs and globules of oil-like material. The maceral bituminite, in contrast, is considered to be the metabolic by-product of bacteria. Above the rank of medium volatile bituminous, liptinites are often optically indistinct from the vitrinite ground mass in reflected light, unless special techniques are utilized, such as etching.

4.3 The term inertinite was originally chosen to describe the infusible nature of certain highly reflecting macerals during carbonization, thereby incorporating the

macerals fusinite, semi-fusinite, micrinite, macrinite, sclerotinite and inertodetrinite on the dual basis of morphology and a technological property.

4.4 The analogy between coal macerals and rock minerals is very misleading. Rock forming minerals by definition are naturally occurring inorganic substances that possess an orderly internal structure and a characteristic chemical composition. They are crystalline, and have definite physical properties. In contrast, those microscopically distinct entities termed coal macerals do not possess a recognizable crystal form or even a resolved molecular structure. They are essentially non-crystalline. They do not possess a structure consisting of atoms, ions or molecules in a regular, repeating pattern typical of a crystalline substance. Analysis of certain aspects of maceral chemistry reveal that there are variations within the same variety of maceral, variations that underline the chemical diversity of the original plant species or distinct phases in the life-cycle of the precursor organism. Individual submacerals, macerals and maceral groups are typically recognized by their morphology, botanical affinity, optical properties or technological property. *See* Table A.

TABLE A

MACERAL GROUP	MACERAL	ORIGIN
Vitrinite	Telinite	Humified plant remains typically derived from woody, leaf or root tissue with well to poorly preserved cell structures
	Colinite	Humified material showing no trace of cellular structure
	Vtirodetrinite	Humified attrital or less commonly detrital plant tissue with particles typically being cell fragments
Liptinite (exinite)	Sporinite	Outer casing of spores and pollens
	Cutinite	Outer waxy coating from leaves, roots and some related tissues
	Resinite	Resin in-tilling of cells and ducts in wood resinous exvdations from damaged wood
	Fluorinite	Essential oils in part: some fluorinite may be produced during physically chemical coalification and represent non-migrated petroleum
	Suberinite	Cork cell and related tissues
	Bituminite	Uncertain. possibly algal or bacterial origin
	Alginite	Tests of some groups of green algae: material referred to alginite shows moderate to strong fluorescence
	Exudatinite	Veins of bitumen-related material expelled from organic matter during coalification
	Laptodetrinite	Detrial forms of liptinite that cannot be differentiated
Inertinite	Fusinite	Fusinite originates from wood and leaf tissue oxidation
	Semifusinite	Wood or leaf tissue weakly altered by mouldering or by biochemical alteration
	Inertodetrinite	Similar to fusinite or semifusinite but occurring as small fragments
	Macrinite	Humic tissue probably first gelified and then oxidized by processes similar to those producing semifusinite
	Scierotinite	Moderately reflecting tissue of fungal origin, largely restricted to Tertiary coals
	Micrinite	Largely of secondary origin formed by disproportionation of lipid or lipid-like compounds

5.1 Coal is defined, characterized and classified according to its moisture content, inorganic and organic content and utilization characteristics (e.g. coking propensity). There are two internationally recognized terms that specifically provide the means to describe the quality of a coal with respect to the organic (i.e. petrographic) and inorganic fractions of coal. They are coal *type* (indicating the maceral composition) and coal *grade* (indicating mineral content), respectively. Such considerations of coal quality are embodied within the United Nations sanctioned Economic Commission for Europe "Hard Coal Codification System." In contrast, most domestic schemes, such as the ASTM Classification of Coal by Rank, are based upon one or two modes of analysis, are simplistic and hierarchical, and were originally designed to specifically reflect the needs of a domestic market, a domestic supply of coal and usage (i.e. empirical). In short, such means of characterization were technology based, typically the production of metallurgical coke. To maintain a degree of standardization in the analysis of a highly variable substance such as coal, the ASTM published detailed guidelines and procedures regarding the analysis of coal (e.g. ASTM D1412-75 "Proximate Analysis"). Proximate analysis provides a measure of the relative volatile and non-volatile organic fractions, inherent moisture and non-combustible material within coal, obtained by either the thermal distillation or the combustion of coal. "Fixed carbon" is not measured directly, but represents the difference in an air dried coal between the sum of the moisture, volatile matter, ash content and 100 percent.

5.2 Equilibrium moisture, moisture-holding capacity, bed moisture and inherent moisture are all synonyms to describe the moisture content of the undisturbed coal in a coal seam. The moisture within coal is considered to be retained as either: superficial water or bulk water which may be present in cracks, capillaries, and large pores; physically absorbed water which is held in small

micropores; and chemisobed water. Moisture, volatile material and fixed carbon have been traditionally used as indices of rank (the level of coalification attained by coal), especially for low ranked coals (i.e. lignite), whereas volatile matter and fixed carbon are used for coals of higher rank (i.e. medium volatile bituminous). Even if moisture is not portrayed as a rank parameter, the derived value as representing moisture are used to standardize and normalize those values pertaining to volatile matter and fixed carbon.

5.3 Volatile matter represents bulk weight loss, corrected by moisture, when the coal is heated in specific apparatus under standardized conditions. The volatile matter evolved during heating includes gases and thermally distilled tar, the proportion of which has been showed to vary with coal rank.

5.4 Fixed carbon is considered to be the carbonaceous material remaining in the sample after the expulsion of moisture and volatile material and is obtained by difference. However, the term "fixed carbon" is an unfortunate misnomer because the term implies the existence of an entity within coal that has chemical meaning. Because the value represented "fixed carbon" is largely dependent upon volatile matter content, which itself varies depending upon experimental conditions, the proportion of carbon remaining in the sample cannot be truly regarded as fixed or finite.

5.5 The inorganic fraction of coal, as mined, exists as mineral matter, elements and trace elements. The term ash and mineral matter content are not interchangeable. Ash represents the residue that remains following the complete combustion of all organic materials under standardized conditions and consists of oxides and sulfates.

6. Coal is not a polymeric substance. Coal is a complex, heterogeneous, non-crystalline material, with an unknown molecular structure of extremely high molecular

weight. Considering the heterogeneous and highly variable nature of coal, attempts to represent such a heterogeneous material by modeling a single average coal molecule necessarily oversimplifies the structure of coal.

7.1 A useful approach to conceptualizing the structure of coal is to view it as consisting of two phases. One phase of coal structure consists of the macromolecular matrix. This phase consists of very large and complex molecules that form a matrix or network. Within this matrix are spaces or voids. The other phase of coal structure consists of smaller molecules which are entrapped or held within the spaces and voids of the macromolecular matrix. This phase is often labeled the "mobile phase." An illustration of this two-phase concept of coal structure is depicted in Figure One.

Two-component system:

- Macromolecular three-dimensional cross-linked network (immobile phase)
- Multitude of relatively small molecules with varying structures embedded therein (mobile phase, 10-50% share)

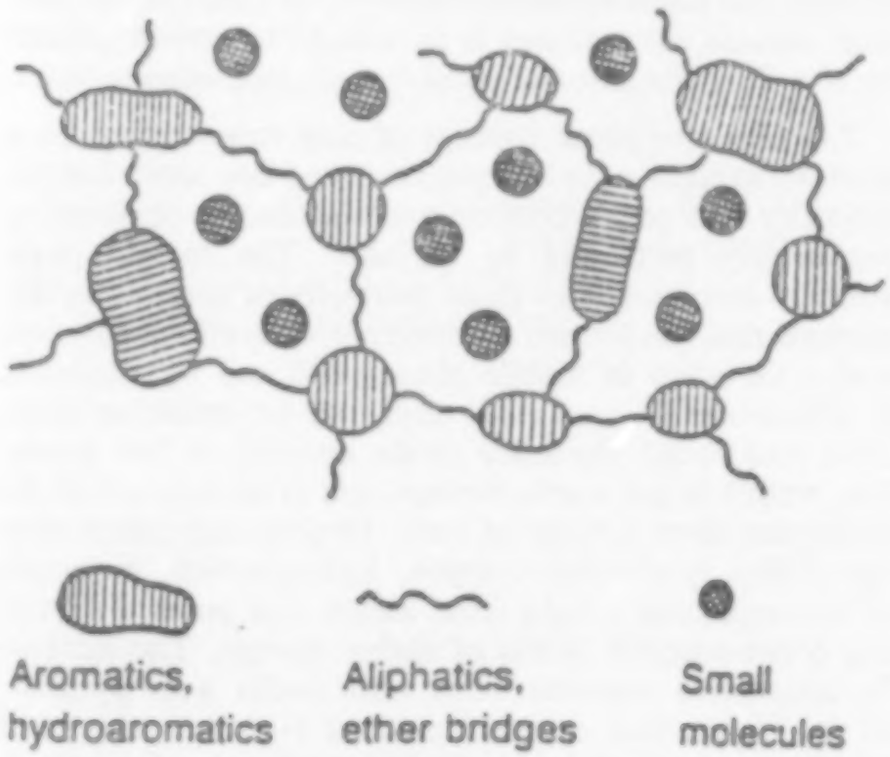

FIGURE ONE

7.2 Some of the molecules comprising the mobile phase are physically entrapped within the macromolecular matrix. Examples of such molecules would be medium weight hydrocarbons or "oils." These molecules are large enough that they become physically intertwined in the macromolecular matrix. Another example of molecules which form part of the mobile phase would be lighter molecular weight hydrocarbons or "gases." These molecules are retained on the surfaces of the macromolecular matrix.

7.3 In untreated coals, only a portion of the mobile phase is readily extractable with common organic solvents, but following treatment with coal-swelling solvents (e.g. pyridine) the yield of extractable material increases markedly. Thus, part of the mobile phase is physically trapped and the remainder is loosely bonded to the maceral molecular network. In contrast, the greater proportion of coal, the macromolecular network, is insoluble in common organic solvents and is considered to consist primarily of a three dimensional, cross-linked, molecular network.

7.4 The two phase concept of coal structure has been used to explain auto-florescence properties, coal thermoplasticity and coal oxidation and weathering phenomena, particularly pertaining to vitrinite. The mobile phase strongly correspor[illegible] to those thermally extractable hydrocarbons that are [illegible]ed by natural coalification processes, and a variation in [illegible]obile phase yield can be attributed to differences in coal rank, coal type or oxidation state. That coal could physically retain material of low molecular weight is not a new concept, and is reminiscent of the molecular sieve concept of coal. Organic solvents possess the ability to dislodge trapped, hydrogen-rich, molecules of low molecular weight from within coal pores, by forming donor-acceptor bonds of higher energy. The increase in extractable material when coal swells with pyridine, or the higher than expected yield of n-alkanes after mild pre-heating suggests the physical occlusion of material, or clathration, within the maceral molecular network of coal. That methane possesses the ability to participate in the clathrated structure is evidenced by the existence of methane hydrates, in which methane and other light hydrocarbon gases are retained within the three dimensional structure of ice.

7.5 The inorganic fraction of coal consists of minerals, elements, and trace elements. Minerals may occur within coal as small, disseminated granular inclusions, as lenses or layers (known as partings), as concretions or

nodules, cleat or fissure infillings, or as large masses of rock. In contrast, elements and trace elements are either physically trapped or chemically-bonded by the organic fraction of coal. Peat is a highly efficient trapping medium, capable of either physically or chemically trapping inorganic material, and a relationship exists between the type and concentration of some of the inorganics within peat (and hence coal) and the characteristics of the peat-forming environment.

FURTHER affiant sayeth naught.

/s/ Stephen L. Bend
STEPHEN L. BEND

[Notary omitted]

EXHIBIT ONE

Curriculum Vitae

Stephen Leonard Bend

146 Laubach Crescent
Regina
Saskatchewan
Canada
S4S 6M3

telephone (306) 584-5709

Vocational Perspective

I consider myself to be an Organic Geochemist and an Organic Petrologist, a person who possess a wide range of skills within those two related disciplines, coupled with a range of interests that extend from basin evaluation, the characterisation of source rock and related products to aspects of coal science. A broad industrial experience is supplemented and complimented by both a MSc and PhD related specifically to those areas. A solid understanding of microscopy is demonstrated through the design and construction of an eyepiece digital display unit (UK patent applied for).

Education

Doctor of Philosophy Degree

University of Newcastle upon Tyne, UK. 1986-1989

Thesis:

'Coal Characterization and Combustion Efficiency'

Supervisor:

Professor H. Marsh

Outline:

The thesis investigates the merits of using petrographic techniques, in conjunction with more traditional methods, when seeking to characterise coal feed stock for use in pulverised fuel combustion. Significant aspects of the work includes the investigation of oxidation phenomenon upon maceral fluorescence, which was included in a recent *International Energy Agency Review* (Morrison, 1990), and the recognition of several causal links between aspects of the molecular structure of coal and the nature of the pyrolysate product and char.

Master of Science Degree

University of Newcastle upon Tyne, UK., 1985-1986

Subject:

Organic Petrology and Organic Geochemistry

Dissertation:

'The Hydrous Pyrolysis of Fossil Resin'

Supervisor:

Dr. M. Fowler and Professor D. G. Murchison

Outline:

The MSc Advanced Course provided an understanding of the principles of organic patrology and the organic geochemistry of coals, oil shale, bitumen, oils and kerogen. The Dissertation discusses the hydrocarbon generating potential of fossil and modern remains using the technique of *hydrous pyrolysis,* which simulates the generation of hydrocarbons under natural conditions. The analysis of generated products and source materials was achieved by using elemental analysis, gas chromatography (g.c.), g.c.-mass spectroscopy and ultra-violet light microcopy. Results suggest that resinite may generate hydrocarbons at relatively low levels of thermal maturity.

Bachelor Degree (Hons)

University of Keele, U.K., 1974-1978

Subjects:

Geology and Geography (Joint Honours)

Subsidiaries:

Geochemistry and History

Outline:

The geology course consisted of the following broad subject areas: Principles of optical microscopy and optical mineralogy, igneous and metamorphic petroleum sedimentary petrology structural geology, palaeontology, stratigraphy, economic geology, inorganic geochemistry, field excursions to Norway and Western Scotland, and an individual mapping project (Malvern Hills).

College and Secondary School

Clarendon College, Nottingham, UK., 1971-1974
Brown Rigg Boarding School, Northumberland, UK., 1965-1971

Employment Record

March 1990-present

Assistant Professor and Research Scientist: Department of Geology, University of Regina, Canada. I was appointed as an Assistant Professor to the Department of Geology in February 1990 and specifically hired as an Organic Geochemist and Organic Petrologist. I have taught the undergraduate courses in *Organic Geochemistry and Organic Petrology* (the only one offered in Canada), *Petroleum Geology, Palaeontology* and *Introductory Geology.* I have also taught the following graduate level courses: *Recent Advances in Geochemistry* and *Current Problems in Organic Petrology.* I am presently supervising a Masters Student and I have assisted in the training of a former Doctorate student.

June 1984-September 1985

Organic Geochemist: Employed by *Exploration Logging Canada.* I was requested by Exporation Logging Canada to create an *Organic Geochemistry Laboratory* based in Halifax, Nova Scotia. I was responsible for recruiting, training and supervising a staff of three technicians for the purpose of conducting rapid source-rock evaluation using the 'Rock-eval', Total Organic Carbon (Leco), gas chromatographic and pyrolysis-gas chromatographic techniques. My developing interest in Organic Geochemistry, during this time, prompted my return to higher education in 1985.

January 1979-June 1984

Petroleum Logging Geologist: Employed by *Exploration Logging Overseas Ltd.* I joined *Exploration Logging Overseas Ltd.*, in January 1979, as a *Mudlogging Geologist/Wellsite Geologist* and spent over five years working either off-shore or on-shore in the Oil and Gas Exploration Industry.

Initial experience was gained in the *Beryl Oil Field, North Sea,* and in the *Gulf of Suez, Egypt.* My first independent assignment was for Mobil, and later for Exxon, in the *Giajiura Peninsular, Columbia.* Both assignments rendered excellent personal experiences, forcing me to face situations (e.g. instrument failures) with extremely limited resources and the use of initiative became the key to job survival in those [Illegible] locations.

Following the completion of all contracts in Columbia, I opted for a transfer to *Canada* in September [Illegible] and was initially assigned to work in *Alberta and British Columbia,* Western Canada. I was subsequently requested by Exlog Canada to head a team of Logging Geologists on a new contract for

Mobil Oil *et al.* on the Hibernia O-35 'wildcat' exploration well. It was this well that firmly established the potential of the Hibernia field.

During my first year in Canada, I established a reputation with my Company as a person who was able to teach and train new employees the necessary skills for wellsite work. Over a period of nine months I trained six graduates.

In June, 1980, I was promoted to Wellsite Geologist and returned to the Alberta/B.C. foothills for B.P. Canada. This job brought satisfaction through the various demands and responsibilities placed upon [Illegible] B.P. Canada.

I transferred back to Europe in July, 1981, for a two year assignment where I gained further [Illegible] experience in the Dutch North Sea and within the *Persian Gulf,* working for Pennzoil and Shell respectively. Upon return to Canada in July, 1983, I was reassigned to the *Hibernia Field* and later to the *Nova Scotian Shelf.*

Pre-university

Prior to attending University in 1974, I was employed by the *Central Electricity Generating Board,* Power Gen.) Ratcliffe-on-Soar Power station, Nottinghamshire, England, as an Engineering Assistant to the Outage Planning Dept. in 1974.

Publications

Stasiuk, L., Kybett, B. D., & Bend, S. L.

"An assessment of thermal maturity using micro-FT-ir and petrography"
Conf. Proc. of the TSOP Annual Meeting, Pen. State., 20th - 24th July, 1992

Bend, S. L.

"The origin, formation and petrographic composition of coal"
Journal of Fuel. 1992 June 71. p.851-870

Bend, S. L., Edwards, I.A.S. and Marsh, H.
"The influence of coal rank upon the formation and combustion of coal"
Journal of Fuel. 1992 April. 71, p493-501

Bend, S. L., Edwards, I.A.S. and Marsh, H.
"Coal provincialism, coal characterization and char formation"
Journal of Fuel. 1991 October. 70, p1147-1150

Bend, S. L., Edwards, I.A.S. and Marsh, H.
"The effects of oxidation and weathering on char formation and coal combustion"
in: *'Coal Science II'*, (Schobert, H., Bartle, K., and Lynch, L. Eds.) ACS Symposium Series 461. 1991 (Chapter 22) p284-298

Koslowski, D. and Bend, S. L.
"The oxidation of low rank coals"
Ext. Abstracts, Haquebard Symp., Gac-Mac Meeting, Wolfville, Nova Scotia, 24th - 27th May, 1992

Bend, S. L., Edwards, I.A.S., Kuo, K. and Marsh, H.
"Aspects of coal oxidation and char combustion"
Proc. of the Third Coal Res. Conf. Wellington, New Zealand, 9-11th Oct. 1989, p230-239

Bend, S. L., Edwards, I.A.S. and Marsh, H.
"Coal characterization and combustion efficiency"
Proc. Int. Conf. on Coal Science. October 1989 p437-440

Bend, S. L., Edwards, I.A.S. and Marsh, H.
"The effects of oxidation and weathering on coal combustion"

American Chemical Society, 198th National Meeting, Div., of Fuel Chemistry, September 1989, Miami Beach, U.S.A., 34 (3), 923-930

Bend, S. L., Edwards, I.A.S. and Marsh, H.
"Coal pre-oxidation and combustion behaviour"
Proc. 19th Biennial Conf. on Carbon, American Chemical Soc., Penn. State Univ. University Park, P.A., U.S.A., 26-30th June 1989, p604-606

Bend, S. L., Edwards, I.A.S. and Marsh, H.
"Petrographic characterisation of coal feedstock related to combustion efficiency"
7th Int. Conf. on Carbon., Newcastle upon Tyne, U.K., September 19-23rd 1988, Ext. Abstracts, I.O.P. Press, Bristol, U.K. p594-596

Full papers submitted or 'in-press'

Stasiuk, L. D., Kybett, B. D., & Bend, S. L.
"Reflected light microscopy and Micro FT-ir of Upper Ordovician G. Prisca alginite in relation to palaeo-environment and petroleum generation, Saskatchewan, Canada"
Submitted to the international journal of *Organic Geochemistry and Organic Petrology* (under review)

Bend, S. L. and Kosloski, D.
"A petrographic analysis of coal oxidation phenomenon"
Submitted to the *International Journal of Coal Geology* (accepted for publication)

Bend, S. L. and Nambudiri, V.
"The fluorescence of wood and the potential of fluorescence of microphotometry"
Submitted to the *Canadian Journal of Forestry Research* (in-press)

Conference presentations submitted and under consideration

Bend, S. L.
"The FT-ir TGA analysis of oxidised low rank coal emissions"
Submitted to International Conference on Coal Science Bi-annual Meeting (September 1993)

Stasiuk, L., Kybett, B. D. and Bend, S. L.
"Micro FT-ir of oil-prone macerals, palaeozoic hydrocarbon source rocks from Saskatchewan, Canada"
Submitted to GAC MAC Joint Annual Meeting (May 1993)

Kosloski, D. and Bend, S. L.
"The influence of inherent moisture during the oxidation of low rank coal"
Submitted to GAC MAC Joint Annual Meeting (May 1993)

Previous Conference Attendance

TSOP Annual Meeting, 20th - 24th July, 1992 Penn State University, State Coll., Pennsylvania, USA
44th International Meeting of the ICCP, 19th - 23rd July 1992, Penn. State University, Pennsylvania, USA
Haquebard Symposium, GAC-MAC Meeting, Wolfville, Nova Scotia, 24th - 27th May, 1992
Canadian Society of Organic Petrographic June, 1991, Edmonton, Alberta.
Canadian Society of Organic Petrographic June 1990, INRS-Petrole, Quebec.
'Coal Structure and Reactivity' September 1990, Cambridge, England.
'Advances in Coal Science: Peter Given Memorial Symposium' September 1989, Miami Beach, USA
'Carbon '88 - 7th International Conference on Carbon' September 1988, Newcastle upon Tyne, England
41st Meeting of the International Committee for Coal Petrology September 1988, Aachen, Germany

'Micro '87: Industrial and Biomedical Microscopy' July 1987, London, England.
'6th International Conference on Coal Technology and Economics' June 1987, London, England.
'Coal Science '87: International Conference on Coal Science' October 1987, Maastricht, The Netherlands
'Coal and Coal-bearing Strata: Recent Advances' April 1986, London, England.

Seminars and Workshops Attended

'Low Rank Coal Combustion' July 1991, Billings, Montana.
Hydrocarbon Exploration of the North Sea March 1986, Newcastle upon Tyne, England.
Evaporites and hydrocarbon exploration, January 1986. J.A.P.E.C. Burlington House, London, England.
Petroleum Geochemistry, July 1984, J.A.P.E.C., Imperial College, London, England.
Drill Stem Testing, April, 1981, Lynes Wireline, Calgary, Alberta, Canada.
'Canadian Stratigraphic School', October, 1980, Canstrat Inc. Calgary, Alberta, Canada.

Grants Received

1992 $75,000 (for 3 years)
from Saskpower, Prairie coal and Estevan coal
'The geochemistry and petrology of minerals and trace elements within lignite'
1991 $50,400 (for 3 years)
National Sciences Research Council (Canada)
'An evaluation of oxidation tests suitable for low rank coals'
1990 $4,760
Presidents National Sciences Research Council (Canada)
1990 $5,000
Faculty of Science Start up Grant

Societies and Professional Affiliations

Geological Society of London, UK. (Fellow)
International Committee for Coal Petrology (Member)
The Society for Organic Petrology (Member)
Canadian Petrography Society (Member)
Canadian Thermal Analysis Association (Member)
Saskatchewan Geological Society (Member)

Serving on the Review Board for:
the International Journal of Fuel
the International Journal of Coal Geology
and assessing grant applications for the National Sciences and Enginering Research Council of Canada

Miscellaneous and Personal Information

Non-vocational achievements

Represented Great Britain at the 1982 Ski-orienteering Pre-World Championships at Lavarone, Italy
Placed 34th in the world championship rankings

Hobbies/Interests

Photography, painting, horology, Competitive cross-country skiing and Biathlon, Orienteering.

References

Prof. D. G. Murchison (tel. 91-222-6000 ext. 6605)
N.R.G. (Newcastle Research Group)
Drummond Building,
The University,
Newcastle upon Tyne,
NE1 7RU
England

Prof. H. Marsh (tel: 618-453-7351)
Department of Geology
Southern Illinois University at Carbondale
Carbondale,
Illinois
62901-4324
USA

IN THE UNITED STATES DISTRICT COURT
DISTRICT OF COLORADO

[Caption Omitted]

Case No. 91-B-2273

AFFIDAVIT OF JAMES T. COOPER

James T. Cooper, being duly sworn, deposes and says:

1. My name is James T. Cooper. I am employed by Energy Fuels Corporation as Vice President of Operations for Coal Property. I reside at 2949 South Biscay Street, Aurora, Colorado, 80013.

2. I have previously been employed as President of Sunnyside Mine (a coal mine in Utah), self-employed as a consultant with regard to coal mining and worked for Jim Walter Resources (a coal mining operation in Alabama). A copy of my resume is attached as Exhibit 1.

3. I have been retained by the Southern Ute Indian Tribe to describe the concerns of an operator and manager of coal mining operations about coalbed methane and how the production of coalbed methane may effect the operation of a coal mine. I prepared a report setting forth my views on these matters and had my deposition taken by the defendant Amoco on March 25, 1993.

4. Since miners first went underground for coal production, they have been acutely aware of a hazardous, highly explosive gas in the coal. Although it sometimes contains other gases, that gas is commonly referred to as methane. This gas is always present in coal. Methane is known to be highly explosive in an atmosphere that contains 5-15% of methane. Current federal regulations require methane to be kept at 1% or less of the atmosphere in all active working places of underground coal mines.

5. Methane originates during the coalification process. The coalification process is the forming of coal from plant

material (plant to peat to lignite coal to sub-bituminous coal to bituminous coal to anthracite coal). It is contained within the coal seam and the cleats and fractures of the coal and adjacent structures. Coal seams as sources of methane are characterized by the coal rank, pressure (depth) and hydrogeologic conditions.

6. Coal miners have known that coal seams contain methane which normally is liberated from freshly disturbed coal and contained in fractures in the coal seam. To diminish the dangers of methane in underground coal mines, operators traditionally increased ventilation (pumping of fresh air) into the mine. The purpose of increasing ventilation is to maintain a non-explosive atmosphere in the mine. Traditionally, the air circulated through the mine has been vented to the surface.

7. Methane is also a serious consideration with regard to the transportation of coal. Because methane continues to escape from the coal even after it is mined, steps must be taken to ensure adequate ventilation as the coal is transported from the mine to the place of use. All enclosures (storage facilities, tunnels, ships, etc.) that contain coal have to be proeprly ventilated. This ventilation is required to ensure that methane, which is lighter than air, does not accumulate in the enclosure and create an area of explosive atmosphere.

8. As the federal mining regulations developed, maximum limits of methane content in the mining atmosphere were established as requirements for safe mining. This increased the cost of production. In the early 1960s and 1970s, the U.S. Bureau of Mines conducted research on how to improve mine safety. This research focused on the existence of methane in coal seams and methods of control of the gas. As a result of this early work, the coal industry began degasifying coalbeds in advance of mining. Early attempts at degasification were vertical boreholes and later horizontal boreholes in the coal seam. Degasification yielded immediate benefits, including improved

safety and decreased cost, to the coal industry. The gas produced by coal degasification was also sold by the coal operator.

9. From operating experience, coal miners know that the coal must be acted upon or disturbed in some manner (exposure, cutting, crushing, shooting, . . . etc.) to liberate the methane. From a coal operator's viewpoint, the methane can only be obtained by altering the coal seam (artificial stimulation). The Jim Walters Resources' Black Warrior methane recovery project for their Alabama coal mines illustrates this. Approximately 83% of the methane produced is from the gob area (mined areas), 7% from vertical wells and 10% from horizontal wells.

10. The artificial stimulation required to disturb the coal seam in order to produce coalbed methane is a matter of concern to the coal mine operator. The effect of the stimulation on the coal seam and adjacent structure, above and below, are normally adverse to the needs of a coal mine operator. Coal miners normally consider fractures of the coal seam or adjacent structures to have a negative impact on coal production. A fractured roof, floor and/or seam generally translates into additional operating costs, loss of productivity and increased safety hazards in coal mining. In addition, the introduction of substances (i.e., gels, sands, . . . etc.) into a coal seam to be mined creates problems for the coal producer who is concerned about the quality of the product.

FURTHER THE AFFIANT SAYETH NAUGHT.

/s/ James T. Cooper
JAMES T. COOPER

[Notary Omitted]

EXHIBIT ONE

JAMES T. COOPER

Business

1200 17th Street
Suite 2500
Denver, Colorado 80202
(303) 623-8317

Residence

2949 South Biscay Street
Aurora, Colorado 80013
(303) 680-1139

CAREER OBJECTIVE

Challenging management responsibilities in the mining industry.

QUALIFICATIONS SUMMARY

Over twenty years of management experience with responsibilities including administration, engineering, maintenance and production. Experience encompasses all phases of surface and underground coal mining. Noted for having a through understanding of the coal industry with skills in the following:

- Management and Leadership
- Cost Management
- Productivity and Safety
- Organizational Development
- Directing Engineering, Financial and Acquisitions Group
- Marketing
- Human Relations
- Implementing Turnarounds

CAREER HIGHLIGHTS

Start up of nine mines; five of which were new operations.

Led acquisitions efforts resulting in the purchase of property, minerals, equipment and operating businesses.

Directed financing activities for the purchase of three operations.

Chaired Management Team negotiating 1981 UMWA Labor Contract. Negotiations resulted in a three-year agreement with two holidays, one sick day, $.05/hour less than the standard Western UMWA Labor Agreement and no interruption to the operation.

Orchestrated numerous UMWA grievances and arbitrations that resulted in favorable decisions. Returned a 3.8 mmty surface operation to profitability: 33.8% reduction in employment (35.1% salared personnel and 33.3% reduction UMWA union personnel); 30% reduction in cost: and 0% capital expenditures while maintaining the production rate. Directed the return of three underground operations to profitability since 1980.

Directed the development and implementation of safe, environmentally sound, productive mine plans.

Excellent knowledge of mining regulations, labor regulations and labor contracts.

Implemented substantial manpower reductions while increasing annual production at every operation.

Earned the reputation of a well-organized, decisive leader who consistently meets or exceeds goals and targets by building and motivating teams of results-oriented managers.

Responsible for and/or participant in negotiations of long-term coal supply agreements (one $80-million).

Noted for being hard working, honest, direct and fair.

MANAGEMENT HISTORY

Sunnyside Mines, Inc.	1989-1990
Boulder, Colorado	President
Energy Fuels Corporation	1979-1989
Denver, Colorado	Vice-President-Operations
Steamboat Springs, Colorado	Mine Manager
Jim Walter Resources, Inc.	1972-1979
Tuscaloosa, Alabama	Maintenance Superintendent
Tuscaloosa, Alabama	Division Maintenance Engineer
Tuscaloosa, Alabama	Sr. Electrical Engineer
Tuscaloosa, Alabama	Sr. Project Engineer
Amoco Chemicals Corporation	1970-1972
Decatur, Alabama	Sr. Plant Engineer

EDUCATION

University of Alabama

B.S. Electrical Engineering 1968

Additional courses in advanced management, economics, cost management, leadership, motivation, labor and environmental regulations, mining techniques and human resources.

PROFESSIONAL AFFILIATIONS

Society of Mining Engineers

Rocky Mountain Coal Mining Institute

Mountain States Employers Council

IN THE UNITED STATES DISTRICT COURT
DISTRICT OF COLORADO

[Caption Omitted]

Case No. 91-B-2273

AFFIDAVIT OF J. CRAIG CREEL

J. Craig Creel, being duly sworn, deposes and says:

1. My name is J. Craig Creel. I am a petroleum reservoir engineer. I am presently employed as the Executive Vice President of Cawley, Gillespie and Associates, Inc. My work address is 302 Fort Worth Club Building, Fort Worth, Texas 76102.

2. At Cawley, Gillespie and Associates, I am involved in reservoir engineering, the estimation of oil and gas reserves and the resulting future cash flow, and the estimation of the value of oil and gas reserves. This involves the application of petroleum reservoir and production engineering techniques. I was previously employed by Sun Oil Company as a production and reservoir engineer. I have performed reservoir engineering services in the Ignacio Blanco gas field. This field includes the Southern Ute Indian Reservation. I am familiar with both conventional natural gas and coalbed methane production and reserves in the Ignacio Blanco field. I am familiar with the completion and production techniques used for both conventional natural gas and coalbed methane wells. A copy of my resume is attached to this Affidavit.

3. I have been retained by the Southern Ute Indian Tribe to describe the differences between a coalbed methane and a conventional natural gas reservoir, including gas origin, trapping mechanism, gas storage, gas fluid flow, and production techniques.

4.1 *Definitions.* To prevent misunderstanding, certain terms need to be defined as they are used within the petroleum industry.

4.2 "Natural gas" is defined as hydrocarbons or mixtures of hydrocarbon and non-hydrocarbon components that exist as a vapor phase at the temperature and pressure under consideration.

4.3 "Hydrocarbon liquids" are hydrocarbons or mixtures of hydrocarbon and non-hydrocarbon components that exist as a liquid phase at the temperature and pressure under consideration.

4.4 "Porosity" is the portion of the void space within a rock expressed as a percentage or fraction of the bulk volume of the rock. The porosity in conventional natural gas reservoirs in the San Juan Basin ranges from 3% to 20% with an average of 14%. The coalbed methane reservoirs of the Fruitland coal formation have a porosity of less than 3%.

4.5 "Permeability" is the measure of a rock's ability to transmit fluids along a pressure gradient. For example if a well is drilled into a conventional sandstone natural gas reservoir that has a pressure of 1,000 pounds per square inch it will create a point of low pressure and gas will flow through the porous standstone to the wellbore. The flow of a fluid[1] through a permeable medium is described by Darcy's Law. The unit of measurement for permeability is called the Darcy. In a reservoir rock such as sandstone, oil or gas within it exist in a "free" state, i.e. the molecules of the oil or gas are not physically bound to the surfaces within the reservoir rock. Darcy's Law states that the magnitude of the fluid mass flow rate is proportional to the cross-sectional area through which flow occurs, the permeability and

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[1] In this context, a "fluid" may be either a gas or a liquid.

the pressure gradient. Movement of a free fluid occurs in the direction of decreasing pressure.

4.6 "Reservoir" is a naturally occurring subsurface body of permeable rock that contains pore spaces in which hydrocarbon liquids and/or hydrocarbon gases reside. Sandstone and limestone are examples of permeable rock that often contain the pore spaces in which oils and/or gases may reside. Another essential characteristic of a reservoir is a trapping mechanism. One example of a trapping mechanism is a layer of impermeable rock overlying the strata of porous and permeable reservoir rock which forms a cap that acts as a seal and does not allow the oil or gas to escape upwards. Examples of cap rocks are salt and shale. Without a trapping mechanism, the oils or gases residing in the pore spaces are free to migrate and disperse.

4.7 The "diffusion coefficient" of a rock is the measure of that rock's ability to transmit fluids which are physically bound within the rock, i.e., are not "free," as the result of a difference in the concentration of that fluid from one location within the rock to another. For example molecules may be sorbed, or physically bound, within coal. The flow of sorbed fluids is described by Frick's Law. Frick's Law states that the magnitude of fluid mass transfer is proportional to the surface area through which flow occurs, the diffusion coefficient, and the concentration gradient. Movement occurs in the direction of decreasing concentration.

4.8 "Conventional" oil and gas reservoirs. An example of a conventional oil and gas reservoir is a sandstone formation capped by shale. On the Southern Ute Indian Reservation the Pictured Cliffs sandstone formation is a conventional natural gas reservoir.

4.9 "Unconventional" oil and gas reservoirs are those reservoirs with characteristics that are significantly different from conventional reservoirs. For example, a coalbed methane reservoir is universally regarded as unconventional.

5. The flow of free fluids within a reservoir and the flow of sorbed fluids within a reservoir are two entirely different properties. The performance of conventional natural gas reservoirs in the San Juan Basin is controlled by Darcy's Law only. The performance of coalbed methane reservoirs within the San Juan Basin are controlled by *both* Frick's Law and by Darcy's Law.

6. Over 99% of the gas in a conventional reservoir exists in a free state within the pore spaces. In the unconventional coalbed methane reservoir of the Fruitland formation, a minimum of 95% of the gas exists in the sorbed state within the macromolecular matrix of the coal.

7. The natural gas in most conventional reservoirs does not originate in the reservoir. Rather, the gas originated in a different rock strata, or source rock, and migrated into the reservoir where it was trapped. The gas in a coalbed methane reservoir originated in the coal. In other words, the coal was both the source rock and is the depository for the natural gas.

8. As mentioned above, the porosity of a coalbed methane reservoir is markedly different than the porosity of a conventional natural gas reservoir. Despite the fact that a coalbed methane reservoir is much less porous than a conventional reservoir, a cubic foot of Fruitland coal with only 0.5% porosity will contain much more methane than a cubic foot of a conventional sandstone reservoir with 20% porisity. This difference is due to the fact that most of the methane in coal exists in a sorbed state within the macromolecular matrix of the coal whereas virtually all of the methane in a conventional sandstone

reservoir exists in a free state. Figure 1 shows this difference.

9. As noted above, the trapping mechanism of a conventional natural gas reservoir is often an impermeable barrier which caps the permeable reservoir rock so that free gas cannot flow out. Many different trapping mechanisms exist. *See e.g.,* Marlan W. Downey, "Evaluating Seals for Hydrocarbon Accumulations," *The American Association of Petroleum Geologists,* V. 68, No. 11, November 1984, p. 1752. None of these trapping mechanisms are necessary for a coalbed methane reservoir to exist. This is because the methane is bound within macromolecular structure of the coal by the forces of sorption. Unfractured coal is virtually impermeable. In other words, free gas exists in a coalbed methane reservoir only in the cleats and fractures of the coalbed. Darcy flow of free gas in a coalbed can occur only within the fractures and cleats. A coalbed may be overlaid by a strata of porous sandstone, i.e., is not capped by an impermeable barrier, and still function as a reservoir. Stated another way, the trapping mechanism of a coalbed methane reservoir exists within the reservoir rock itself. The trapping mechanism of a conventional natural gas reservoir exists outside the reservoir rock.

10. Drilling a well into a reservoir and opening the valve at the surface will reduce the pressure within the reservoir. For example, if a well is drilled into a conventional natural gas reservoir with an initial reservoir pressure of 1400 psi and gas is produced until the reservoir pressure is depleted to 400 psi, then 75% of the gas-in-place will be recovered. The same amount of pressure reduction in a Fruitland formation coalbed methane reservoir will result in recovery of only 30% of the gas-in-place. For each pound per square inch of pressure decrease that a pressure depletion reservoir undergoes, a fixed volume of gas will be produced. The production curves for conventional natural gas reservoirs and coalbed

methane reservoirs in relation to reservoir pressure reduction are markedly different. These are shown in Figure 2.

11. Comparing the cumulative production from conventional natural gas and coalbed methane wells in La Plata and Archuleta Counties, Colorado demonstrates that the production of water is correlated with coalbed methane wells. Over 97% of the conventional natural gas wells have produced less than 100 barrels of water for each million cubic feet of natural gas production. Only 7% Fruitland formation coalbed methane wells have produced such small volumes of water. This is illustrated in Figure 3. The production of large volumes of water is an integral part of coalbed methane production in this portion of the San Juan Basin.

12. When a Fruitland formation coalbed methane well is drilled in this portion of the San Juan Basin, the pressure in the reservoir adjacent to wellbore is reduced by producing water. As more water flows into the wellbore and out of the reservoir, the sorbed methane molecules break the bonds that hold them within the macromolecular structure of the coal and begin to diffuse through the macromolecular matrix due to the concentration gradient and Fick's Law. The methane molecules continue to diffuse from the matrix until they reach fractures or cleats. When the methane molecules diffuse into a fracture or cleat it becomes free gas and flow is governed by pressure differentials and Darcy's Law. A coalbed methane reservoir exhibits different behavior with decreasing pressure than does a conventional natural gas reservoir. Figure 2.

13. The completion techniques and production equipment used for coalbed methane wells are usually different from the techniques and equipment used for wells completed in conventional natural gas reservoirs. This is particularly true in Southwest Colorado. Since 1987, approximately 200 Fruitland formation coalbed methane

wells have been completed as open-hole cavity completions. According to Matthew Mavor, a consultant to Amoco, in the San Juan Basin there were approximately 870 open-hole cavity completion attempts as of September 1991 out of a total of approximately 2200 wells. This is a completion technique unique to coalbed methane.

14. The open-hole cavity completion technique, in lay terms, involves using highly pressurized air and water to blow out a spherical cavity in the coalbed at the bottom of the wellbore. The portion of the wellbore in the coalbed and the cavity are not cased and are therefore called "open." The open-hole cavity technique extracts solid coal up the wellbore. The chunks of solid coal that are removed from the coalbed are the same material as mined coal. Up to 100 tons of solid coal may be removed from the wellbore by this technique.

15. Other coalbed methane completion techniques result in the extraction of solid coal, although in lesser amounts.

16. Because coal is impermeable, most coalbed methane wells that have been completed using a technique other than open-hole cavitation have been hydraulically fractured and stimulated. There are many different hydraulic fracture and stimulation techniques used on coalbed methane wells. Some coalbed methane fracture and stimulation techniques have been patented. In general, the purpose of fracturing and stimulating a coalbed methane well is to expand the natural fractures in the coal seam, and prop those fractures open to create more space within the coalbed which can hold and transmit gas in a free state. Coalbed methane wells are fractured by injecting thousands of gallons of stimulation fluids down the wellbore and out into the coalbed under extremely high pressure. There are a variety of stimulation fluids including, hydrochloric acid, nitrogen foam, carbon dioxide foam, cross-linked gelled water, linear gelled water, and water. The fractures created are often propped open

by injecting sand into them. As much as 120,000 pounds of sand is injected down the wellbore and out into the coalbed. Fracturing and stimulating a coalbed methane well will affect the coalbed up to hundreds of feet away from the wellbore.

17. Since most Fruitland formation coalbed methane wells in Southwest Colorado produce water, the production equipment used with these wells is different from that installed on wells completed in conventional reservoirs. Based on reported initial production, over 50% of the Fruitland formation coalbed methane wells are produced using some means of artificial lift. The most common artificial lift technique is downhole rod pumps, but some wells are produced by gas/lift techniques.

18. Virtually all completion techniques used on coalbed methane wells result in a significant alteration of the natural state of the coalbed. Solid coal is extracted from the coalbed. Typically, vast quantities of water are removed from the coalbed. Foreign substances are often injected into the coalbed.

19. The quality of gas produced by Fruitland formation coalbed methane wells is also different from the gas produced from conventional reservoirs. Less than 40% of Fruitland formation coalbed methane wells produce gas with a heating value over 1000 BTU per standard cubic foot of gas. Over 70% of conventional gas wells produce gas with a heating value over 1000 BTU per standard cubic foot. The composition of gas produced from Fruitland formation coalbed methane wells also differs from the composition of gas produced from conventional reservoirs. In general, Fruitland formation coalbed methane wells produce a gas with a higher concentration of carbon dioxide. Conventional reservoirs in the same area produce a gas with higher concentrations of ethane and almost no carbon dioxide. Coalbed methane produced from Fruitland formation coalbeds is unique

and differs from gas produced from deeper conventional reservoirs in the same area.

20. The volume of coalbed methane produced in Southwest Colorado increased markedly beginning in approximately 1987-88. The history of production volume in this area is shown in Figure 4.

FURTHER AFFIANT SAYETH NAUGHT.

/s/ J. Craig Creel
J. CRAIG CREEL

[Notary Omitted]

Figure 2

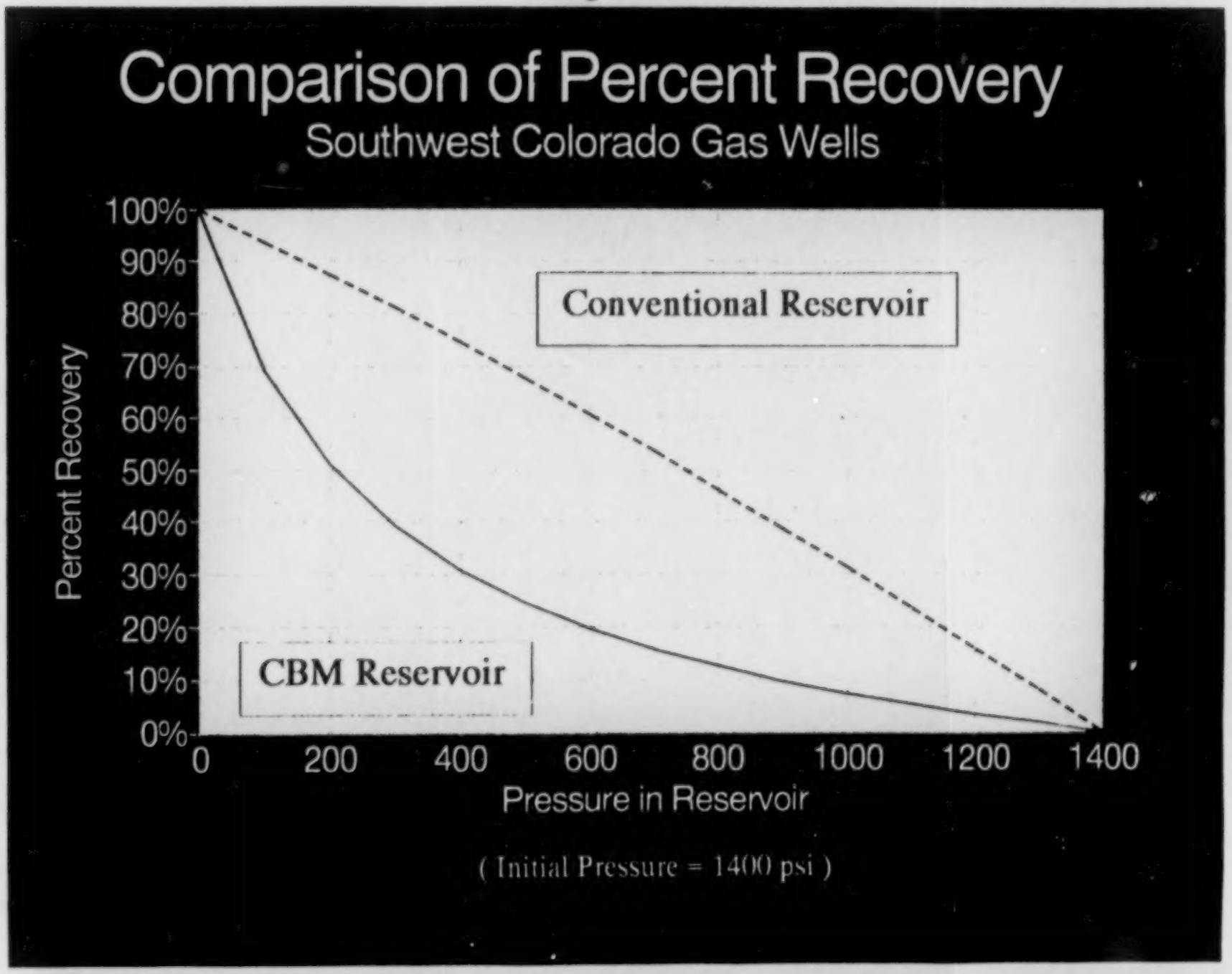
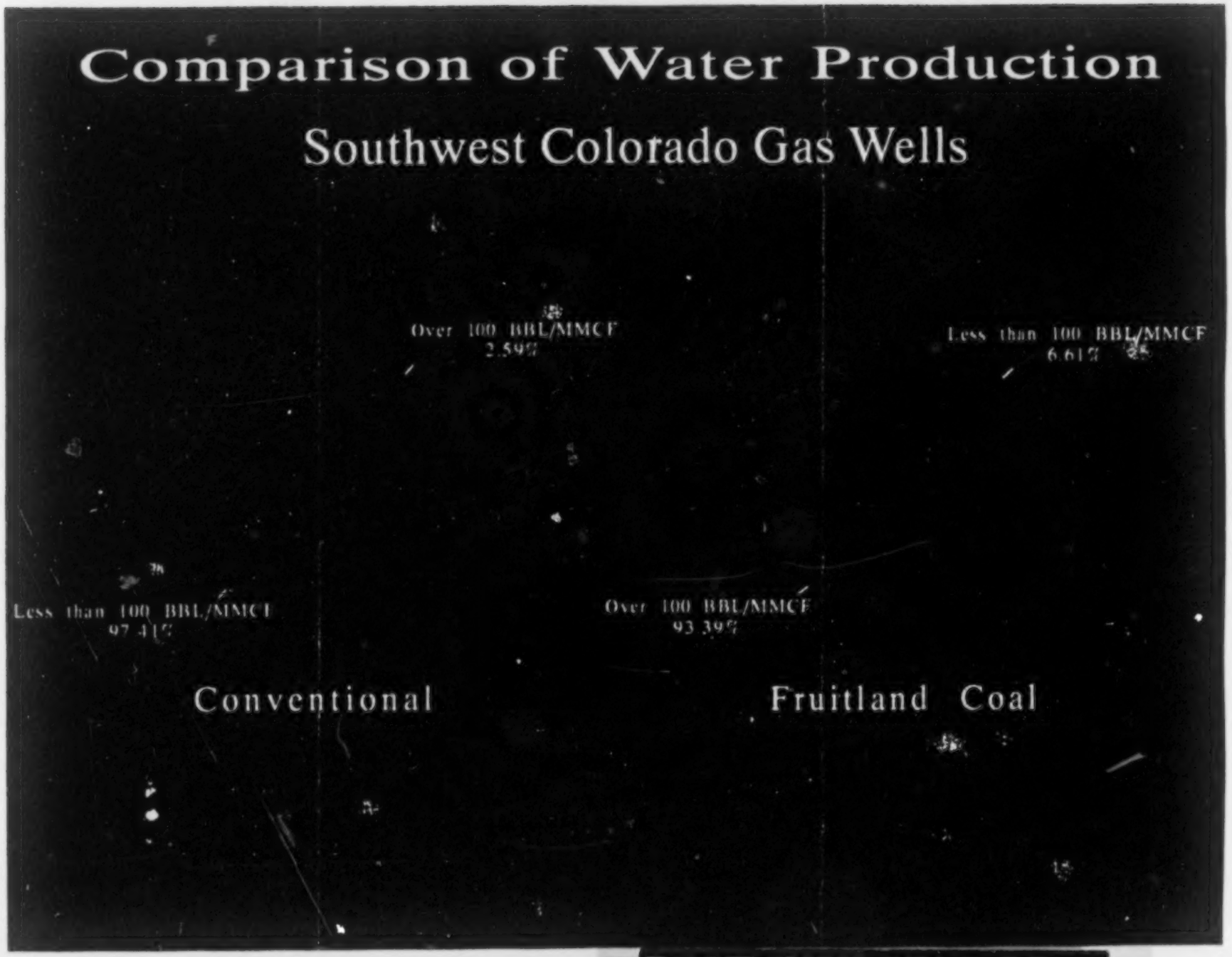


Figure 2

Figure 3



BEST AVAILABLE COPY

Figure 3

J. CRAIG CREEL

CAWLEY, GILLESPIE & ASSOCIATES, INC.
306 W. 7th St., Suite 302
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(817) 336-2461

BIOGRAPHICAL DATA

Birthdate: June 30, 1952 Marital Status: Married,
Citizenship: United States three children

EDUCATION

College

B.S., Cum Laude, Petroleum Engineering, Texas A&M University (1974)

Honor Societies

Pi Epsilon Tau (Petroleum Engineering Honor Society)

EXPERIENCE

Cawley, Gillespie & Associates, Inc., Exectuive Vice President (January 1992-Present)

Involved in the estimation and audit of oil and gas reserves, the forecast of these reserves and their resulting future cash flow, and the estimation of the value of the reserves. This involves the application of petroleum reservoir and production engineering techniques, as well as the estimation and utilization of various economic parameters such as oil prices, gas prices, and operating expenses. Performs coalbed methane reservoir studies, performance evaluations, gas-in-place estimates, log analysis, reserve and economic evaluations, drainage studies, plans for drilling.

Interfacing with clients on a daily basis. Involved in the writing and designing of the custom software used

within the firm. Have performed numerous reservoir simulations on oil and gas fields located both in the Continental U.S. and elsewhere.

Cawley, Gillespie & Associates, Inc., Senior Vice President (January 1989-December 1991)

Estimation of oil and gas reserves, forecasts, future cash flow, value estimation of the reserves. Performed reserve audits, and supplied various reports to financial institutions. Evaluation of coalbed methane reserves. Prepared various field studies for optimization of reserve depletion and economic investment criteria.

Cawley, Gillespie & Associates, Inc., Vice President (January 1988-December 1988)

Estimation of oil and gas reserves, forecasts, future cash flow, value estimation of the reserves. Performed reserve audits, and supplied various reports to financial institutions. Prepared various field studies.

Cawley, Gillespie & Associates, Inc., Petroleum Consultant, (October 1976-Present)

Joined firm in October 1976. Assisted senior engineers with property evaluations; performed reservoir simulation studies; prepared evaluations for acquisitions. Company principal since 1980.

Sun Oil Company, Production/Reservoir Engineer, Richardson, Texas and Lafayette, Louisiana (May, 1974-October, 1976)

Involved in the daily operations of a major field located in southern Louisiana. Responsible for maintaining the producing rates and for identifying, recommending compiling workovers and recompletions. Was transferred to the Richardson Reservoir Simula-

tions Lab to work on the reservoir description and mathematical simulation of several of Sun Oil's major fields.

PROFESSIONAL AFFILIATIONS

Society of Petroleum Engineers

Registered Professional Engineer in Texas-Registration #4425

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLORADO

[Caption Omitted]

Case No. 91-B-2273

AFFIDAVIT OF JEFFREY R. LEVINE

STATE OF ALABAMA)
) ss.:
COUNTY OF TUSCALOOSA)

Jeffrey R. Levine, first being duly sworn, deposes and says:

1. My name is Jeffrey R. Levine. I reside at 1805 13th St. E., Tuscaloosa, Alabama 35404. I am self-employed as a consulting geologist with offices at 2715—7th St., Tuscaloosa, Alabama 35401.

2. I have previously been employed by The University of Alabama, where I worked for seven years as Associate Research Geologist. I have also worked for two years as Research Associate in Sedimentology at McGill University in Montreal, Canada, and for three years as Research Geologist at the United States Bureau of Mines, Pittsburgh Mining and Safety Research Center, Methane Control and Ventilation Group. A copy of my resume is attached as Exhibit 1.

3. In 1983, I received my Ph.D. in Geology from Pennsylvania State University, specializing in coal geology. My doctoral thesis was entitled "Tectonic Evolution of the Pennsylvania Anthracite Region Using Coal Reflectance Anisotropy".

4. During my career, I have specialized in the study of what is commonly referred to as coalbed methane. While

employed by the Bureau of Mines, I participated in some of the earliest, pioneering research work in this area. Specific projects at the U.S.B.M. included co-supervising the drilling of an experimental methane drainage bore hole in the Pennsylvania Anthracite region; evaluating coalbed methane resource potential in the San Juan and Raton basins, New Mexico and Colorado; assisting in development of U.S.B.M. "direct method" calculation of coal bed gas concentrations; and compilation of data on gas yields of coal as a function of coal rank and depth.

I have worked on diverse projects relating to coalbed methane at The University of Alabama. Specific research topics include studies of methane sorption in coal, sorption-related swelling of coal, coalbed methane resource assessments, and novel methods of coal analysis.

I have also developed and conducted industry-oriented training course(s) on coalbed methane, including a short course entitled "Introduction to Coal Petrology with Applications to Coalbed Methane R & D". These courses have been taught in a variety of academic and industry settings including The University of Alabama, Pennsylvania State University, the Institut Francais du Pétrole (French Petroleum Institute, Paris), MIM Holdings Ltd. (Brisbane, Australia), Shell Development Company (Houston, TX), ARCO Exploration and Production Technology (Plano, TX), Alberta Research Council (Edmonton, Alberta), among others.

5. I have published approximately 25 professional papers during my career. I have authored or co-authored 12 articles and 10 abstracts specifically related to coalbed methane, including resource assessment, analytical methods, and geologic controls.

I have recently delivered invited Keynote Addresses on the topic of coalbed methane at three international meetings: the International Committee for Coal and Organic Petrology (University Park, PA, July, 1992), the Symposium

on Coalbed Methane Research in Australia (Townsville, Australia, Nov., 1992) and the ARCO Coal Symposium (Plano, TX, April, 1993).

6. I have been retained by the Southern Ute Indian Tribe to provide advice regarding the composition and origin of coal, particularly as related to the production of gas (commonly referred to as "coalbed methane") from coal seams. Specifically, I was asked to address the following questions: What is coal? What are the constituents of coal? Is coalbed methane a part of coal; and in what ways do coalbed reservoirs differ from conventional gas reservoirs? I prepared a report addressing these topics and had my deposition taken by the defendant Amoco.

7. The three most important conclusions that I have reached regarding the relationship of coalbed methane to coal are:

A. Coalbed methane is a constituent of coal. This view can be supported from the standpoint of coal chemistry, widely-used definitions of coal, and from a pragmatic perspective.

B. The constituents of "coalbed methane" remain in coal indefinitely (on a human time scale) unless they are "caused" to dissociate from the coal by reduction of fluid pressure in the coalbed as a result of drilling, pumping, flowing of gas, or other disturbances.

C. Geologic evidence indicates that: 1) most of the coalbed methane produced from San Juan basin coals formed within the coals themselves, as a product of coalification, and 2) coalification occurred and was concluded for the most part tens of millions of years ago. The coalbed methane so-formed has remained as part of the coal up to the present day.

8. Coal eludes a precise definition, even from a scientific perspective, owing largely to its complex and highly

variable nature. In spite of any differences among them, however, most published definitions of coal include three unifying elements: A) coal is a type of sedimentary rock, B) coal is comprised primarily of carbonaceous material, and C) coal is readily combustible. Beyond this, coal composition can be quite complex and variable. In the end, coal can be satisfactorily defined only through a detailed description of its composition and structure.

9. A particularly functional definition of coal appears in the American Geological Institute's Dictionary of Geological Terms (Bates and Jackson, 1980). This definition is adapted from the definition(s) originally developed by Dr. James M. Schopf of the U.S. Geological Survey (Schopf, 1956, 1966):

> coal—a readily combustible rock containing more than 50% by weight and more than 70% by volume carbonaceous material including inherent moisture, formed from compaction and induration of variously altered plant remains similar to those in peat. Differences in kinds of plant materials (type), in the degree of metamorphism (rank), and in the range of impurity (grade) are used in classification.

10. Certain important published definitions or descriptions of coal specifically mention water as a constituent of coal (Bates and Jackson, 1980; ASTM, 1991). Water behaves analogously to methane. If water is regarded as a constituent, then it is arbitrary not to regard other small molecular species such as methane as constituents of coal. For purposes of mining and commerce, water is routinely considered to be a constituent of coal. Federal guidelines published by the Office of Surface Mining (a division of the U.S. Department of Interior) stipulate that tonnages of coal mined and shipped must be calculated with respect to "inherent moisture" content. These regulations define inherent moisture as "moisture that exists as an integral part of the coal seam in its natural state, including water

in pores but not that present in macroscopically visible fractures" (emphasis added). This is also consistent with the definition of coal discussed previously (Bates and Jackson, 1980) which specifically regards moisture as a constituent of coal.

11. Definitions of coal describe coal as a mixture of constituents (i.e., a physical amalgam of constituents). Compositional heterogeneity is apparent at a variety of scales, ranging from "lithotypes" visible to the unaided eye (millimeters (10^{-3} m) to centimeters (10^{-2} m) in dimension), to "macerals" visible through the optical microscope (micrometers (10^{-6} m) in dimension), to "molecular scale" variability (nanometers (10^{-9} m) in dimension), discernible via gas chromatography and mass spectroscopy. The significance of the term "mixture" cannot be overemphasized, as it provides one of the keys to understanding coal composition and structure. In a chemical sense, a "mixture" refers to any combination of two or more substances that are not chemically bound to each other.

12. At a microscopic scale (i.e. at the limits of resolution of an optical microscope, which is approximately 10^{-6} m), coal can be regarded as being analogous to concrete in its composition and structure, in that both materials are comprised of mixtures of physically-associated materials. Concrete is an aggregation of sand and gravel bound together by Portland cement, while coal is an aggregation of (inorganic) mineral grains and (organic) "macerals" bound together in an organic matrix, all of which are part of the coal. When originally deposited, peats (which are the precursors of coal) comprise loosely compacted masses of vegetal remains. The vegetal remains are not chemically bound together (although they may be physically intertangled), and the peat may be readily broken apart by hand. During the coalification process, however, the woody material becomes depolymerized, partly solubilized, and gelified. At higher rank, in response to increased temperatures and pressures, this gel dehydrates, and the coal develops a physical coherency. The gelified material, which will become vitrinite, functions as the "glue" which binds the coal together, in much the same manner that Portland cement binds concrete together. The liptinite and inertinite macerals and mineral grains function in a similar manner to sand and gravel in concrete—lending strength to the mixture. Although all of the macerals and minerals in coal are consolidated in this way into a more-or-less coherent mass, they tend to maintain their distinct identity and morphology.

13. Many of the constituents of coal can be separated by using purely physical methods, i.e. without necessitating the breakage of chemical bonds. At the lithotype scale (cf. #11, above), mineral matter-rich layers in coal can be separated by using gravity separation methods. At the maceral scale, macerals can be segregated into groups by using ultra-fine grinding, followed by "density-gradient centrifugation". At the molecular scale, solvents can be used to remove soluble components, which can range up to 40% or more, depending upon the particular coal, and solvation method used. (Solvation, by definition, does not involve chemical bond breakage). Desorption of occluded gases can be regarded as a physical separation technique.

14. Uranium is a common trace element occurring in most coals, and may be present in varying amounts. When present, uranium typically has an "organic affinity"; that is to say, it is intimately associated with the organic fraction rather than the mineral fraction of coal. Distinct uranium-bearing mineral phases are typically not present, leading researchers to conclude that it is bound in some manner to the organic constituents of the coal.

15. Beginning with its initial deposition as a sediment on the earth's surface and continuing throughout its history, coal undergoes a progressive and ongoing evolution in composition and structure termed "coalification". Coal

"rank" provides a measure of the degree of coalification. The physical and chemical changes associated with coalification largely represent the response of sedimentary organic matter to elevated temperatures and pressures in the depths of the earth. Even though the composition and structure of coal may be radically altered during this process, the single term "coal" encompasses all such materials.

16. Methane originates along with other volatile substances as a product of coalification. Volatile coalification products are partly retained within the coal structure, wherein they become part of the coal, and partly expelled into surrounding strata, where they can form conventional (migrated) oil and gas deposits.

17. The organic molecular structure of coal is comprised primarily of the elements, carbon, hydrogen and oxygen. These element are assembled in a diverse number of molecular structure. The process of coalification, from peat through anthracite rank, is manifested by the progressive enrichment in elemental carbon accompanied by the depletion in hydrogen and oxygen. Hydrogen and oxygen are depleted in the form of methane (CH_4), carbon dioxide (CO_2), and water (H_2O).

18. The theoretical end member of coalification is pure carbon, in the form of graphite (although this is rarely attained in nature). Crystalline graphite is comprised of layered sheets of carbon atoms, arranged in a hexagonal pattern. Within these layers, the carbon atoms are bonded to one another with very strong covalent bonds. However, adjacent layers are held together only by very weak physical (Van der Waals) bonds. A crystal of graphite is comprised of many such layers stacked upon on another. The weakness of these interlayer physical bonds allows for the use of graphite as a lubricant, as the layers readily 'slip' next to one another.

19. Coal contains within its structure a certain proportion of comparatively small molecules commonly referred to as the "mobile phase" or "molecular fraction". The molecular fraction of coal evolves simultaneously with the rest of the coal as part of the coalification process. Methane is part of the molecular fraction of coal and represents the lowest molecular weight end-member of a complex series of hydrocarbons. Methane exhibits a similar relationship to coal structure as water, hydrocarbons, and other components of the molecular fraction. All of these substances occur as molecules that are not covalently bonded to one another but are weakly bonded to or physically entrapped within the coal structure. The matrix fraction of coal is linked together by relatively strong covalent bonds. Molecular constituents of coal are retained by much weaker "physical" bonds, including "hydrogen bonds" and Van der Waals bonds, as well as by physical "entanglements". Bond strength cannot be used as a criterion for distinguishing that which is "coal" from that which is not coal.

20. The polar forces that bind water to the coal structure are much stronger on average than the weak Van der Waals bonding that holds methane. Also, water can bond to itself, owing to its strong dipole moment. As a consequence, water is typically present in coal in much higher concentrations than methane, particularly at low rank. Nevertheless, water, mehane and other hydrocarbons all "compete" with one another for accessibility within the coal structure. To be fully understood, all the molecular components of coal must be regarded as part of a complex multi-component system.

21. The molecular fraction of coal contributes to the "volatile matter" measured in standard coal tests. The molecular fraction also contributes toward the soluble "bitumens" that can be produced from so-called "bituminous" coals. The coals underlying the Southern Ute Indian

Reservation are bituminous coals, having a high volatile matter yield.

22. Underground coal seams throughout the world contain an enormous quantity of methane (CH4) and other light hydrocarbon substances occluded within their molecular structure (estimated 400-800 trillion cubic feet in United States coals alone). ("Occluded" is a term in chemistry meaning adsorbed or absorbed in great quantity.) A variety of other small molecular species are also commonly present in coal, such as carbon dioxide (CO_2), nitrogen (N_2) and water (H_2O). For hundreds of years, the presence of these substances was manifested principally through their (unavoidable) release and discharge into underground coal mine workings, where they can pose a serious safety hazard. Methane, when liberated into the coal mine atmosphere, is the principal constituent of "firedamp" (a traditional miners' term for combustible mine gases), and is explosive when mixed with air in proportions from 5 to 15%.

23. Over the past two decades, technologies have been developed which enable commercial gases to be extracted from coal seams. Coal seam gas production has been successfully undertaken in association with active mining operations (before, during, and after mining), as well as in "virgin" coal seams where no active mining has yet taken place. It is the goal of coal seam degasification projects to produce gas at rates and volumes that render it economically competitive with other sources of natural gas. When done as part of an active mining operation, this process reduces the waste of hydrocarbon gases that would normally be liberated during mining.

24. Coalbed methane represents a fraction of coal that can be volatilized and released from coal by changing the ambient conditions. These volatile components (predominantly methane gas, plus some water, carbon dioxide, and notrogen, in most cases) can be released either by modifying the ambient pressure conditions, increasing the ambient temperature, or a combination of the two. Increasing the temperature also increases the *rate* at which volatile substances are released. Volatile gases escape from the coal by first diffusing from the coal matrix into a fracture. Once free from the coal microstructure, they assume the form of a free fluid (either liquid or gas). In this form, they may flow through the coal, assuming that there is a pressure gradient established. (Given a permeable medium, fluids tend to flow from high pressure to low.) The gases that are released from coal in this way effectively become what is known as "coalbed methane" or "coal bed gas". Prior to their conversion to a gaseous state, they are effectively part of the coal structure.

25. Removal of such volatile components of coal as methane, carbon dioxide, and water, is associated with volumetric shrinkage of the coal. This shrinkage phenomenon has been documented at several different laboratries, including my own studies conducted for the U.S. Department of Energy at The University of Alabama. Shrinkage is observed at all coal ranks and for all coal types. Volumetric shrinkage is proportional to the quantity of the occluded substance present, and typically represents only a few tenths of one percent change in length. The shrinkage phenomenon demonstrates that these substances are not merely occupying vacancies within the coal structure, but are interacting with and causing physical rearrangement of the coal.

26. The production of gas from coalbed reservoirs typically involves three fundamental elements: A) drilling a hole, B) completion/stimulation, and C) production of reservoir fluids. Drilling and installation of production tubing provides an open conduit through which reservoir fluids (typically water plus methane-rich gas) may be conducted to the surface. Completion/stimulation is intended to increase the interface and connectivity between the well

bore and the coalbed. This is usually done either by hydraulic fracturing or by "cavitation" method.

27. Production of gas normally entails the removal of water from the well by pumping. Pumping serves two purposes: A) It maintains a point of low pressure within the coalbed toward which fluids will flow and; B) It removes water from the bed so as to allow gases to flow more readily. In their natural state, the fracture networks in San Juan basin coals are usually water-filled. It has been shown, however, that water is essentially absent in some parts of the basin. In either case, when pressure in the bed is reduced, occluded species such as methane migrate out of the microporous coal matrix and into the fracture network where they join any other fracture-resident fluids already present. This mixture of fluids is then free to flow towards the production well. Any water that accumulates on the well bore is pumped off and disposed of. In addition to water, small particles of coal (known as "coal fines") and sand from hydraulic stimulation treatment may also flow into the well bore. The gases are collected, purified if necessary, transported, and sold. On a human time scale, the gases from coalbed reservoirs don't become migratory until the conditions in the coalbed are altered by drilling, stimulation, pumping of water.

28. Coalbed reservoirs differ from conventional reservoirs in many fundamental respects, including the following:

A) Source rock/reservoir rock relationship. In contrast with almost all conventional reservoirs, coals can serve as their own "source rock".

B) Trapping mechanism. Methane and other components of coalbed gas are held within the coal structure by weak bonding forces. Conventional reservoirs require a physical "seal" of low permeability strata to entrap the fluids.

C) Relationship to water. Even in water-saturated coals there may be lots of methane present. In conventional reservoirs, the presence of large volumes of water means that there is little or no producible gas.

D) Size of "porosity". Methane molecules in coal exist as part of the molecular structure, rather than in open "voids" in the rock. Pores in conventional reservoirs are as much as millions of times larger than "pores" in coalbed reservoirs.

E) Physical state of the "gas". Methane, etc., in coal exists in a "sorbed" state. In contrast, the gas in conventional reservoirs exists as a distinct gaseous phase for the most part.

FURTHER AFFIANT SAYETH NAUGHT

/s/ Jeffrey R. Levine
JEFFREY R. LEVINE

[Notary Omitted]

EXHIBIT ONE

Curriculum Vitae

JEFFREY ROSS LEVINE
Consulting Geologist
2715 Seventh Street
Tuscaloosa, Alabama 35401

Born:	January 24, 1953
Citizenship:	United States
Phone:	205-553-8827 (home)
	205-348-7612(fax)

EDUCATION:

Ph.D., Geology, 1983, The Pensylvania State University

Thesis title:

Tectonic evolution of the Pennsylvania Anthracite region using coal reflectance anisotropy

Thesis advisor:

Dr. Alan Davis

M.S., Geology, 1981, The Pennsylvania State University

Thesis title:

Optical anisotropy of coals as an indicator of tectonic deformation, Broad Top coal field, Pennsylvania

Thesis advisor:

Dr. Alan Davis

B.S., Geology, 1974, University of Michigan

Senior project:

Computer simulation of thermodynamic phase equilibria in the system MgO-SiO_2-H_2O-CO_2

Project advisor Dr. Eric Essene

RESEARCH INTERESTS AND EXPERTISE

Research Interests & Experience: Diverse interests relating to the petrology, organic geochemistry, sedimentary geology, and structural geology of sedimentary organic matter, including: generation and expulsion of oil and gas during organic metamorphism, behavior of coal as a production horizon for natural gas ("coalbed methane"), gas sorption studies, porosimetry. Other research interests include: the use of vitrinite reflectance anisotropy as a structural fabric indicator, structural geology and tectonics of foreland basin fold-and-thrust belts; structural fabrics imparted to sedimentary strata during burial, timing of tectonic events vis-a-vis organic metamorphism.

Research and Professional Skills: Sampling, processing, and analysis of coal and kerogen; microscopic analysis of coal and dispersed sedimentary organic matter, including petrography, reflectance and fluorescence measurement; fluid inclusion microscopy with heating/cooling stage; laser Raman microprobe; SEM/EDX and electron microprobe analysis; gas sorption studies using electro-microbalance; microstrain gage instrumentation; microcomputer applications including customized data acquisition systems, statistical analysis, data base management, graphics, and desktop publishing; Associate Editor, The Canadian Mineralogist, Issue on Applied Microscopy in Science and Technology (June, 1986); Past Editor for The Society for Organic Petrology (1989-92), which included compilation and publication of quarterly Newsletter as well as overseeing all TSOP publications.

Teaching Experience: Coal Petrology Lab (PSU), Introductory Geology lab (PSU), Oceanography lab (PSU), Sedimentary Diagenesis (McGill), Clastic Depositional Environments (McGill); Additionally

I have regularly taught a 3 credit hour senior/graduate level course in Coal Geology (UA); Short course on "Introduction to Coal Petrology with Applications to Coalbed Methane R & D"; Various industry training courses and seminars relating to "coalbed methane".

Foreign language proficiency in French.

PROFESSIONAL MEMBERSHIPS AND AWARDS:

Alabama Geological Society (1986-)
Geological Society of America (1982-)
American Association of Petroleum Geologists (1986-)
The Society for Organic Petrology (1985-):
(Councilor: 1987-89; Editor: 1989-1992)
Ph.D. thesis received unanimous superior rating and commendation to Dean (1983)
U.S. Department of Energy Traineeship (1978-80)
NSF Energy-Related Grants Traineeship (1977-78)

EMPLOYMENT HISTORY

10/92 - Present:

Self-employed consulting geologist: Specializing in geology and petrology of coal and other forms of sedimentary organic matter

10/89 - 9/92:

Associate Research Geologist and Adjunct Assistant Professor, Department of Geology, The University of Alabama: Research program in organic petrology and coalbed methane; senior/graduate level course in Coal Geology.

8/85 - 9/89:

Research Scientist, School of Mines and Energy Development, The University of Alabama (Tuscaloosa):

Designed and equipped coal petrology laboratory facility, established a coal research program at the University of Alabama, undergraduate and graduate instruction and research supervision; contributed to minerals processing and fuels research at the U of A Mineral Resources Institute. Coordinator of University of Alabama users group for ORNL-HTML.

8/83 - 8/85:

Research Associate in Sedimentology, McGill University, Montreal, Canada: Conducted research on the sedimentology, diagenesis, and petroleum generation of lower Paleozoic strata in SE Quebec; Undergraduate instruction in sedimentology and diagenesis.

6/74 - 8/77 (full time 8/77) - 8/81 (part time):

Research geologist, U.S. Bureau of Mines, Pittsburgh Mining and Safety Research Center, Methane Control and Ventilation Group: Co-supervised drilling of experimental methane drainage bore hole in Pennsylvania Anthracite region; Evaluated coal bed methane resource potential in New Mexico and Colorado; compiled and analyzed data for USBM "Direct Method" calculation of coal bed gas contents; designed, built, and tested grinding mill for measuring "residual" gas contents in coals.

CONSULTING, SHORT COURSES, and SEMINARS:

I have performed a diverse variety of consulting services and short courses relating to coal geology, organic petrology, petroleum geology, and coalbed methane, including the following:

Alabama Securities and Exchange Commission, Montgomery Alabama
Coal Petrology Study (5/91)

Alberta Research Council, Edmonton, Alberta
Short Course Module: Generation, storage, and

migration of natural gas in coal bed reservoirs (8/90)

American Association of Petroleum Geologists—Energy Minerals Division
Co-instructor for coalbed methane short course, Calgary, Alberta (6/92)

Amoco Production Company
Source Rock Module 1-Coal Seminar: Coal as a Petroleum Source Rock (7/91)

Bowen/Edwards Associates, Inc., Denver, Colorado
Coalbed methane consulting: Coal Petrology/Geochemistry Study (3/92)

Institut Francais du Pétrole, Rueil-Malmaison, France
2-day seminar: "Gaz de Houille" (Natural Gas from Coal) (3/93)

MetFuel, Inc.; Houston, Texas
Three studies of natural fracturing and cleat mineralization (10/90; 1/91; 4/91)

Mount Isa Mines Ltd., Brisbane, Australia
Workshop on coal geology/petrology/coalbed methane (11/92)

Norcen Energy Resources, Ltd., Calgary, Alberta, Canada
Coalbed methane consulting (1990-present)

Pennsylvania State University, University Park, PA
1-day workshop on coalbed methane (6/91)

Petroleum, Inc., Wichita, Kansas
Coalbed Methane: 2-day training course (4/91); Petrographic/Geochemistry Study (3/92)

Shell Development Company Bellaire Research Center
1-day Coalbed Methane Workshop (11/90); Gas Sorption Study (12/92)

Shell Coal International Ltd., London
Coal Moisture Study (12/82)

Southern Ute Indian Tribe, Ignacio, Colorado
Coalbed Methane: Coal Petrology/Geochemistry (1988-present);

Taurus Exploration Company, Birmingham, Alabama
Coalbed Methane: Coal Petrology/Geochemistry Projects

University of Alabama College of Continuing Studies
Short Course: "Introduction to Coal Petrology with Applications to Coalbed Methane R & D": (4/89; 3/90; 9/90; 5/91)

RESEARCH GRANTS AND CONTRACTS:

Donation of Geocom Rock-Eval II and Beckman TJ-6 Centrifuge: Texaco Research Lab, $20,000, (4/86)

Coalbed methane resource evaluation for southern Tuscaloosa County, Alabama (Investigator): Alabama Department of Economic and Community Affairs, $117,000, (7/88 - 9/89).

Coalbed methane technology development in the Appalachian Basin (investigator): Gas Research Institute through Dames and Moore, Inc., $35,559, (10/89 - 9/90).

Study of coal fracture porosity via fluorescent dyed epoxy impregnation: MetFuel, $2,400. (12/90-4/91).

Permeability changes in coal resulting from gas desorption (principal investigator): DOE-Pittsburgh Energy Tech. Ctr., $137,950, (8/89-8/92).

Study of gas sorption behavior and production characteristics of selected Fruitland coals, San Study Juan basin, Colorado (Principal Investigator):

Southern Ute Indian Tribe, $24,500, (8/89 - present)

Study of gas sorption characteristics of Antrim Shale: Shell Development Co., Bellaire Research Center, $10,500, (5/92-present)

RECENT TALKS & PRESENTATIONS:

Talk: "Fault-out-of-syncline structures in the Pennsylvania Anthracite basins and their possible impact on regional coal rank patterns", Invited paper, presented at Nickelsen Symposium: Deformation Mechanisms in Fold-Thrust Belts, at 1991 Northeast/Southeast Section meeting of the Geological Society of America, Baltimore, MD, Mar. 14-16, 1991

Talk: "New methods for assessing gas resources in thin-bedded high-ash coals", presented at the 1991 Coalbed Methane Symposium, May 13-17, 1991, Tuscaloosa, AL

Talk: "The impact of oil formed during coalification on generation and storage of natural gas in coalbed reservoir systems", presented at the 1991 Coalbed Methane Symposium, May 13-17, 1991, Tuscaloosa, AL

Talk: "Compositional controls on natural gas yields from selected Fruitlands coals, San Juan basin, Colorado", presented at the Canadian Society of Petroleum Geologists, 1991 Annual Convention, June 16-19, 1991, Calgary, Alberta, Canada

Talk: "Permeability changes in coal resulting from gas desorption", presented at U.S. Department of Energy, University Coal Research Projects Meeting, June 26, 1991, Pittsburgh, PA

Talk: "Overview of Coalbed Methane Problems", Visiting delegation from People's Republic of

China, University of Alabama, Tuscaloosa, AL, Aug. 14, 1991

Talk: "Five common misconceptions regarding coalbed methane reservoir systems" U.A. Geology Department Seminar, Tuscaloosa, AL, Sept. 25, 1991

Talk: "Five common misconceptions regarding coalbed methane reservoir systems "Geology Department Seminar", presented at Eastern Coalbed Methane Forum, Sept. 26, 1991, Tuscaloosa, AL

Talk: "A gravimetric method of measuring gas sorption in coal", presented at the 8th Annual Meeting of The Society for Organic Petrology, Sept. 30-Oct. 1, 1991, Lexington, KY

Poster Presentation: "Fracture morphology of six Alabama and Wyoming coals, studied by fluorescent epoxy impregnation", presented at the 8th Annual Meeting of The Society for Organic Petrology, Sept. 30-Oct. 1, 1991, Lexington, KY

Talk: "Five common misconceptions regarding coalbed methane reservoir systems "Geology Department Seminar", presented at Western Coalbed Methane Forum, Oct. 17, 1991, Denver, CO

Symposium Chair: "Coalbed Methane: Geology, Recovery Technology, and Resources"; (GSA Coal Geology Division Symposium; co-chair with Dr. Walt Ayers, Taurus Exploration Co.), 1991 Annual Meeting of the Geological Society of America, San Diego, CA. Oct. 21, 1991

Talk: "Reservoir Heterogeneity and gas production characteristics of oil-rich Fruitland coals, San Juan basin, Colorado", presented at Symposium on Coalbed Methane: Geology, Recovery Technology, and Resources, Annual Meeting of the Geo-

logical Society of America, Oct. 21-24, San Diego, CO

Talk: "Coal rank patterns in the Cahaba coal field and surrounding areas, and their significance", presented at 1991 Annual Field Trip, Alabama Geological Society, Nov. 22, 1991, Birmingham, AL

Poster Session: "Fracture morphology of six Alabama and Wyoming coals, studied by fluorescent epoxy impregnation", presented at the Natural Fracture Workshop, University of Texas Bureau of Economic Geology, Austin, June 11, 1992

Invited Keynote Address: "Relationship of the molecular fraction of coal to measurements of porosity and density: Implications regarding the role of coal as a petroleum source rock and reservoir", presented at 1992 meeting of the International Committee for Coal and Organic Petrology (44th), University Park, PA, July 19-23, 1992.

Field Trip: "The Anthracite basins of eastern Pennsylvania": Field trip for the 1992 Joint Meeting of the International Committee for Coal and Organic Petrology (44th) and The Society for Organic Petrology (9th), July 25, 1992 (co-lead with Jane R. Eggleston).

Invited Keynote Address: "Influences Of Coal Composition On Coal Seam Reservoir Quality In U.S. And Australian Basins: A Review", "Symposium on Coalbed Methane Research and Development in Australia", Townsville, Queensland, Australia, Nov. 19-21, 1992.

Invited Keynote Address: "Relationship of the Molecular Fraction of Coal to Measurements of Porosity and Density: Implications for Coal as a Source and Reservoir Rock" ARCO Symposium on Coal, Plano, TX, April 30, 1993.

SELECTED ABSTRACTS:

Levine, J.R. and Davis, A., 1982, Structural evolution of the Western Middle field synclinorium, Pennsylvania, using coal reflectance: Geological Society of America Abstracts with Programs, v. 15, no. 7, p. 546.

Levine, J.R., Paxton, S.T., and Davis, A., 1984, Controls of regional coal rank variation, Anthracite coal fields, Pennsylvania, U.S.A.: The Geological Society and the Mineralogical Society, Meeting on Diagenesis and Low Temperature Metamorphism, Bristol, U.K., April, 1984.

Levine, J.R., 1985, Interpretation of Alleghanian tectonic events in the Anthracite region, Pennsylvania, using aspects of coal metamorphism: Geological Society of America Abstracts with Program, v. 17, p. 31.

Levine, J.R. and Hesse, R. 1985, Origin of fracture-hosted hydrocarbon residues in Taconian nappe sequence near Quebec City: Geological Association of Canada and Mineralogical Association of Canada Joint Annual Meeting, Program with Abtracts, v. 10, A-34.

Levine, J.R., 1986, Diachronous Alleghanian deformation of coal-bearing strata in Pennsylvania, interpreted from patterns of coal rank and reflective anisotropy: 1986 Annual Meeting of The Society for Organic Petrology, Lexington, KY

Levine, J.R., 1987, The influence of rank, grade, and petrographic composition on coal bed natural gas reservoirs: Abstracts and Program, 4th Annual Meeting of The Society for Organic Petrology (San Francisco, CA, Sept. 30-Oct 3, 1987), p. 56.

Levine, J.R. and Davis, A., 1989, Reflective anisotropy of Carboniferous coals in the Appalachian

foreland basin, U.S.A.: Abstracts, 28th International Geological Congress (Washington, D.C., July 9-19, 1989), v. 2, p. 288.

Levine, J.R. and Tang Y., 1989, Secondary porosity in coal and its relationship to coal metamorphism: Coal Meeting '89, Orleans, France (Sept. 12-15, 1989).

Levine, J.R., 1990, Quantitative estimation of volatile yields from coal released during organic maturation: American Chemical Society, Division of Geochemistry Preprints, Proceedings of 199th ACS National Meeting, Boston, MA, Abst. #28.

Levine, J.R., Thompson, D.A., and Telle, W.R., 1990, Coalbed gas resources of Upper Pottsville Fm. near Duncanville, AL: Geol. Soc. of America Abstracts with Programs, v. 22, p. 23.

Tang Y. and Levine, J.R., 1990, Secondary pores in coal: their formation and relationship to coal macerals, Pingdingshan-Jiaosuo coal fields, China: Proceedings, 7th Annual Meeting of The Society for Organic Petrology, Calgary, Alberta, Sept. 8-14, 1990.

Levine, J.R., 1991, Fault-out-of-syncline structures in the Pennsylvania Anthracite basins and their possible impact on regional coal rank patterns: Geological Society of America Abstracts with Programs, v. 23, p. 59.

Levine, J.R., 1991, Compositional controls on natural gas yields from selected Fruitland coals, San Juan basin, Colorado: Canadian Society of Petroleum Geologists, Programme and Abstracts, 1991 CSPG Convention, June 16-19, 1991, Calgary, Alberta, Canada, p. 93.

Levine, J.R., 1991, Fracture morphology of six Alabama and Wyoming coals, studied by fluorescent

epoxy impregnation: Proceedings, 8th Annual Meeting of The Society for Organic Petrology, Lexington, KY

Levine, J.R., Johnson, P.M., and Prakash, G., 1991, A gravimetric method of measuring gas sorption in coal: Proceedings, 8th Annual Meeting of The Society for Organic Petrology, Lexington, KY

Boyce, B.C. and Levine, J.R., 1991, Reservoir heterogeneity and gas production characteristics of oil-rich Fruitland coals, San Juan basin, Colorado: Geological Society of America Abstracts with Programs, v. 23, no. 5, p. A39.

Levine, J.R. and Telle, W.R., 1992, Natural coking has substantially enhanced *in situ* concentrations of natural gas in a high volatile C bituminous coal, Carbon County, Montana: Geological Society of America, Abstracts with Programs, v. 24, no. 7, p. A162.

ARTICLES AND PAPERS

McCulloch, C.M., Levine, J.R., Kissell, F.N., and Duel, M., 1976, Measuring the methane content of bituminous coalbeds: U.S. Bureau of Mines Report of Investigations 8043, 22 p.

Diamond, W.P. and Levine, J.R., 1981, Direct method determination of the gas content of coal: procedures and results: U.S. Bureau of Mines Report of Investigations 8515, 36 p.

Levine, J.R., 1983, Comment on "Time-temperature-burial significance of Devonian anthracite implies former great (— 6.5 km) depth of burial of Catskill Mountains, New York": Geology, v. 11, 122-123.

Levine, J.R., 1983, Coal rank patterns in the Pennsylvania Anthracite region, in Nickelsen, R.P. and

Cotter, E., eds., Silurian Depositional History and Alleghanian Deformation in the Pennsylvania Valley and Ridge: Guidebook for the 48th Annual Field Conference of Pennsylvania Geologists, PA Bureau of Topographic and Geologic Survey, p. 67-73.

Levine, J.R., 1984, Optical anisotropy of coals as an indicator of tectonic deformation, Broad Top coal field, Pennsylvania: Geological Society of America Bulletin, v. 95, p. 100-108.

Levine, J.R., 1986, Deep burial of coal-bearing strata, Anthracite region, Pennsylvania—Sedimentation or tectonics?: Geology, v. 14, p. 577-580.

Levine, J.R., 1987, Influence of coal composition on the generation and retention of coalbed natural gas, in Proceedings of the 1987 Coalbed Methane Symposium, Tuscaloosa, Alabama, Nov. 16-19, 1987: Gas Research Institute, p. 15-18.

Levine, J.R., 1987, Review of "Geochemistry in Petroleum Exploration" by Douglas Waples: Jour. Geol. Education, v. 35, p. 286-287.

Levine, J.R., and Slingerland, R., 1987, Upper Mississippian to Middle Pennsylvanian stratigraphic section, Pottsville, Pennsylvania, *in* Roy, D.C., ed., Northeastern Section of the Geological Society of America, Centennial Field Guide v. 5: Geological Society of America, Boulder, Colorado, p. 59-63.

Levine, J.R. and Hesse, R., 1987, Characteristics and origin of fracture-hosted impsonite, Quebec City area, Canada: Organic Geochemistry, v. 11, p. 425-426.

Levine, J.R. and Davis, A., 1989, Reflectance anisotropy of Upper Carboniferous coals in the Appalachian foreland basin, Pennsylvania, U.S.A., in Lyons, P.C. and Alpern, B., eds., Coal: Classification, Coalification, Mineralogy, Trace-element Chemistry, and Oil and Gas Potential: International Journal of Coal Geology, v. 13, p. 341-373.

Levine, J.R. and Davis, A., 1989, The relationship of coal optical fabrics to Alleghanian tectonic deformation in the central Appalachian fold-and-thrust belt, Pennsylvania, U.S.A.: Geological Society of America Bulletin, v. 101, p. 1333-1347.

Levine, J.R., 1989, Review of "Organic Metamorphism and Geothermal History: Microscopic study of organic matter and thermal evolution of sedimentary basins" by Paul Robert: Journal of Geologic Education, v. 38, p. 65.

Levine, J.R., Thompson, D.A., Telle, W.R., and Thomas, J.N., 1989, A coalbed methane resource evaluation in southern Tuscaloosa County: Alabama: Tuscaloosa, Alabama, The University of Alabama School of Mines and Energy Development Research Rep. 89-1, 90 p.

Levine, J.R., 1990, Generation, storage, and migration of natural gas in coal bed reservoirs, in Coal geology and its application to coal-bed reservoirs—lecture notes for short course: Alberta Research Council Information Series #109, p. 84-130.

Levine, J.R. and Davis, A., 1990, Reflectance anisotropy of Carboniferous coals in the Appalachian foreland basin, Pennsylvania, U.S.A., *in* Lyons, P.C. et al. (eds.), Peat and Coal: Origin, facies and coalification: Special Issue of International Journal of Coal Geology, v. 16, p. 201-204.

Levine, J.R., Samson, L.A., and Hesse, R., 1991, Occurrence of fracture-hosted impsonite and petroleum fluid inclusions, Quebec City region, Canada: American Association of Petroleum Geologists Bulletin, v. 75, p. 139-155.

Ayoub, J., Hinkel, J., Johnson, D., and Levine, J., 1991, Learning to produce coalbed methane: Oilfield Review, Jan., 1991, p. 27-40.

Levine, J.R., 1991, New methods for assessing gas resources in thin-bedded, high-ash coals: 3rd Coalbed Methane Symposium Proceedings, Tuscaloosa, AL, May 13-16, 1991, p. 115-125.

Levine, J.R., 1991, The Impact of oil formed during coalification on generation and storage of natural gas in coal bed reservoir systems: 3rd Coalbed Methane Symposium Proceedings, Tuscaloosa, AL, May 13-16, 1991, p. 307-315.

Levine, J.R. and Telle, W.R., 1991, Coal rank patterns in the Cahaba coal field and surrounding areas, and their significance, *in* Thomas, W.A., and Ooborne, W.E., Mississippian-Pennsylvanian tectonic history of the Cahaba Synclinorium: 1991 Field Trip Guidebook, Alabama Geological Society, p. 99-117.

Levine, J.R. and Eggleston, J.R. 1992, The Anthracite Region of eastern Pennsylvania: Field Trip Guidebook, 1992 Joint Meeting of the International Committee for Coal and Organic Petrology and The Society for Organic Petrology, University Park, PA, U.S. Geological Survey Open File Report 92-568, 72 p.

Levine, J.R., 1992, Influences of coal composition on coal seam reservoir quality: a review, *in* Beamish, B.B. and Gamson, P.D., eds., Symposium on Coalbed Methane Research and Development in Australia, Townsville, Austrlia, Nov. 19-21, 1992: Townsville, Australia, James Cook University, p. i-xxviii.

Levine, J.R., 1992, Oversimplifications can lead to faulty coalbed gas reservoir analysis: Oil & Gas Journal, Nov. 23, 1992, p. 63-69.

Levine, J.R., in press, Coalification: the evolution of coal as a source rock and reservoir rock for oil and gas, *in* Law, B.E. and Rice, D.M., eds., Hydrocarbons from Coal: Tulsa, OK, American Association of Petroleum Geologists.

Levine, J.R., Johnson, P.W., and Beamish, B.B., 1993, High pressure microgravimetry provides a viable alternative to volumetric method in gas sorption studies on coal: Procedings of the 1993 International Coalbed Methane Symposium, University of Alabama/Tuscaloosa, 9 p.

IN THE UNITED STATES DISTRICT COURT
DISTRICT OF COLORADO

[Caption Omitted]

AFFIDAVIT OF DR. HARRY MARSH

Dr. Harry Marsh, being of lawful age and duly sworn, states as follows:

1. *Qualifications.*

1.1 I am a chemist. I hold Ph.D. and D.Sc. degrees. A copy of my resume is attached as Exhibit 1.

1.2 I presently hold the position of Distinguished Visiting Professor in the Department of Mechanical Engineering and Energy Processes at the University of Southern Illinois in Carbondale, Illinois. I have held this position since 1991. I am also Emeritus Professor in Carbon Science in the Department of Chemistry at the University of Newcastle upon Tyne in the United Kingdom. I have been the Director of the Northern Carbon Research Laboratories at the University of Newcastle upon Tyne. I have written 239 papers published in refereed journals, including the journals Fuel, Carbon, Journal of Materials Science, Journal of Colloid and Interface Science, and Erdol und Kohle. I have written 7 book chapters. I have written 186 extended abstracts for a variety of scientific conferences. I have edited the book "Introduction to Carbon Science."

1.3 My research experience has been in the area of carbon science. Within this field, I have placed special emphasis on:

1.3.1 *Carbonization theory:* coals, pitches, resins and woods.

1.3.2 *Adsorption and surface chemistry:* including porosity and surface functionality of coals, active carbons and graphites.

1.3.3 *Gasification/oxidation/hydrogasification:* including kinetics and surface typography of gasification by oxygen, carbon dioxide, hydrogen and atomic oxygen.

1.3.4 *Structural analyses:* including X-ray and electron diffraction, optical texture, transmission electron microscopy and scanning electron microscopy.

1.3.5 *Composites:* including metallurgical cokes and carbon-fibre systems.

1.4 I have devoted a substantial portion of my career to the study of coal. My research about coal has included:

1.4.1 Microporosity in coals: critical assessments of adsorption phenomena in all ranks of coals.

1.4.2 Macro-molecular structure of coals.

1.4.3 Surface functionality in coals.

1.4.4 Coal carbonization and co-carbonization (hydrogen transfer theory and the concept of liquid crystals).

1.4.5 Combustion of coal.

1.4.6 Effects of igneous intrusions into coal seams.

1.4.7 Effects of coal charge pre-heating in cokeries.

2. *Objectives.*

The objective of this affidavit is to provide an overview of the structure of coal from the perspective of a chemist. As will be discussed in more detail below, coal is universally regarded as an extremely complex and heterogenous substance. The mechanisms and forces by which the various constituents of coal are held together are summarized.

The origin of coal and its constituent parts is also summarized.

3. *Definitions and Background.*

When describing coal structure, some specialized terminology is used. Definitions of these terms follow. Although one of the purposes of this affidavit is to provide a detailed description of the chemical and physical structure of coal, it may be useful to begin with some general definitions of coal.

3.1 *Coal.*

3.1.1 "Coal—a readily combustible rock containing more than 50% by weight and more than 70% by volume carbonaceous material, including *inherent moisture*[1], formed from compaction and induration of various plant remains similar to those of peat. Differences in kinds of plant materials (type), in the degree of metamorphism (rank), and in the range of impurity (grade) are used in classification." (emphasis added) American Geological Institute, DICTIONARY OF GEOLOGICAL TERMS (1980).

3.1.2 "Coal is a sedimentary rock accumulated as peat, composed principally of macerals and subordinately of minerals, and containing water and gases in submicroscopic pores." R.N. Neavel, "Coal Structure", Ed. M.L. Gorbaty and K. Ouchi, American Chemical Society, Advances in Chemistry Series, 192, American Chemical Society, Washington, DC, (1981), p. 1.

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1 "Inherent" is defined as "existing in someone or something as a permanent and inseparable element, quality or attribute; innate; ingrained." Random House, WEBSTER'S COLLEGE DICTIONARY, p. 693 (1991).

3.2 *Basic Concepts of Chemistry and Physics.* It may be helpful to review some basic principles of chemistry and physics:

- Matter can be classified according to its physical state (solid, liquid or gas) or according to the nature of its composition (element, compound or mixture).
- Matter can undergo three kinds of changes: chemical, physical and nuclear. Examples of chemical changes are the burning of gasoline, digestion of food or producing plastic from petroleum. When chemical changes occur, the original atoms are preserved, but a new substance with a different chemical composition has formed, i.e., the atoms have been rearranged into new combinations. The boiling of water, melting of ice and the distillation of alcohol are examples of physical changes. In these reactions, the chemical composition of the substances involved remains the same, but the physical form changes.
- An element is a substance composed of atoms having an identical number of protons in each nucleus. Elements cannot be reduced to simpler substances by normal chemical means. There are approximately 109 known elements.

3.3 *Compounds, Molecules and Mixtures.* A compound is made up of two or more elements which have combined together chemically to form the compound. Such substances as water, sugar and salt are compounds. Substances such as milk, paint, ink, air and muddy water are mixtures containing compounds. When mixtures are created from the component compounds no chemical reactions occur. The process of mixing is physical in nature. Mixtures do not have a meaningful chemical composition because the concentrations of the component compounds can vary. Mixtures can be separated into their individual constituents by physical means, e.g., filtration, distillation, crystallization, etc. Mixtures may be comprised of constituent substances in different physical states, i.e., a mixture may contain solids, liquids and gases.

3.4 *Organic Compounds.* The element carbon has the unique ability to form a virtually infinite number of compounds with hydrogen, oxygen, sulfur and nitrogen. About 6,000,000 such compounds, called organic compounds, are known. Coal is an organic material, not a single compound, composed dominantly of carbon-carbon (-C-C-) and carbon hydrogen (-C-H) bonds, and is combusticle.

3.5 *Hydrocarbons.* A hydrocarbon is an organic compound composed of carbon and hydrocarbon only. The simplest hydrocarbon is methane CH_4 (I), a larger hydrocarbon molecule is octane, C_8H_{18} (II) and a ring hydrocarbon is cyclohexane, C_6H_{12} (III).

3.6 *Aromatics.* An organic aromatic compound contains one or more six-membered rings of bonded carbon atoms. Such ring structures are relatively very stable. The simplest aromatic compound is benzene (IV), and a three-membered ring is phenanthrene (V).

3.7 *Coalification.* Coalification is the physical and chemical process by which peat is transformed into coal over geologic time. Coalification is discussed in more detail in Section 4 below.

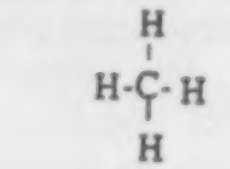
3.8 *Macerals.*

3.8.1 In lay terms, portions of plant material are changed chemically and physically, during the coalification process, into coal macerals. There are different types of macerals which can be distinguished upon microscopic examination. They are classified by the type of plant material from which they originated. For example, the most common class of maceral is vitrinite and is derived from woody plant material.

3.8.2 Coal macerals are chemically complex and contain, among other things, high molecular weight hydrocarbons.

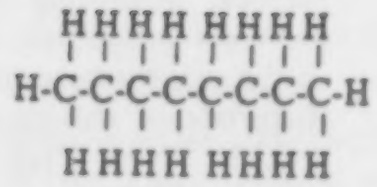
3.8.3 "Macerals are organic substances derived from plant tissues, cell content and exudates that were variably subjected to decay, incorporated into sedimentary strata and then altered physically and chemically by natural (geologic) processes." R.N. Neavel, "Coal Structure", Ed. M.L. Gorbaty and K. Ouchi, American Chemical Society, Advances in Chemistry Series, 192, American Chemical Society, Washington, DC, (1981), p. 1.

Methane (CH_4)



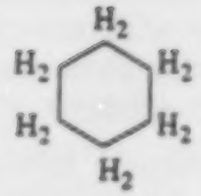
(I)

n-Octane (C_8H_{18})



(II)

Cyclohexane (C_6H_{12})

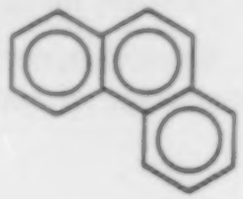


(III)

Benzene (C_6H_6)

(IV)

Phenanthrene ($C_{14}H_{10}$)



(V)

3.8.4 "Coal macerals evolve from the different organs or tissues of the initial coal-forming plant materials during the course of the first stage of coalification. However, because of variable but severe alteration, it is not always possible to recognize the starting materials. Macerals are the microscopically recognizable individual constituents of coal and depending on their quantitative participation and their association, they control the chemical, physical and technological properties of a coal of given rank." International Commission for Coal Petrology (ICCP).

3.8.5 "Macerals are organic substances, or optically homogeneous aggregates of organic substances, possessing distinctive physical and chemical properties, and occurring naturally in the sedimentary, metamorphic, and igneous materials of the earth." William Spackman (1958). New York Acad. Sci., Ser. II, *20* (5), p. 411-423.

3.8.6 Optical micrographs of polished surfaces of several different coal macerals are shown in the color photographs of Figures 1 through 6 of this Affidavit.

3.9 *Mineral Matter.* Mineral matter in coal is the inorganic constituent of coal and is not combustible. Mineral matter is estimated by the low temperature ashing process (LTA), 300°C, in which the organic constituent of coal is combusted in atomic oxygen. Ash is the residue remaining after complete combustion of the organic constitutent of coal, in air at about 900°C. Mineral matter and ash are not identical materials.

3.10 *Porosity.* Coal is a porous material. Stated another way, a characteristic of coal is porosity. Porosity is

the volume element within a solid of zero electron density. In lay terms, porosity is space within a solid. In a macromolecular substance like coal, porosity results from the irregular stacking of constituent molecules. (See Figure 7). Another example of a porous material is wood. Pores come in three categories of sizes: Micropores, mesopores and macropores. This terminology is universally accepted, and defined in International Union of Pure and Applied Chemistry, Pure and Applied Chemistry, 1985, *57*[4], 603-609.

3.10.1 *Micropores.* Micropores are less than 2 nanometers (nm) in width, and have the dimensions of molecules. (A nanometer is a billionth of a meter.)

3.10.2 *Mesopores.* 2 to 50 nm in width.

3.10.3 *Macropores.* Greater than 50 nm in width.

Most of the porosity in coal is microporosity.

3.11 *Moisture.* Coal contains water. The coalification process generates water. Water is part of coal structure. As noted above, many definitions of coal refer to its moisture content. The moisture-holding capacity of a coal is the amount of moisture that a coal will hold when it is in equilibrium with an atmosphere saturated with water vapor (100% relative humidity). "Equilibrium moisture", "moisture-holding capacity", "bed moisture", and "inherent moisture" are all terms used to describe the moisture content of a coal as it would be in a seam. These terms are syonymous. W.J. Montgomery, "Analytical Methods for Coal and Coal Products", Ed. Clarence Karr, Jr., Academic Press, New York, 1978, Vol. 1, p. 200.

3.12 *Coalbed Methane.* Coal contains methane.

3.12.1 Coalbed methane is a constituent of coal being held dominantly within the microporosity of coal by forces of adsorption at high pressures.

3.12.2 Coalbed methane is generated within coal along with the other constituents of coal during the coalification process.

3.12.3 Coalbed methane is not composed of only methane. It is a mixture of gases, dominantly methane, and may also include nitrogen, carbon dioxide, and propane.

3.12 *Adsorption.* Adsorption is the property of a surface between two immiscible phases (usually between a gas and a solid) to attract molecules to that surface and create a concentration much greater than would exist in the absence of the surface. Adsorption is a basic thermodynamic property of surfaces resulting from a discontinuity in intermolecular or interatomic forces. The adsorbent is the solid which adsorbs. The adsorbate is the gas which is adsorbed. Adsorption can be physical in nature, i.e., no covalent bonds occur between the adsorbent and the adsorbate. Some materials may adsorb chemically, i.e., covalent bonds are formed between the adsorbent and the adsorbate. Adsorption, specifically of coalbed methane, is discussed in more detail in Section 6 below

4. *Coalification.*

4.1 *Introduction.* Coal originated from plants. The debris of sinking swampy forests formed, largely under the action of bacteria, large peat deposits. This is referred to as the biochemical phase. The next phase is geochemical. It lasts hundreds of millions of years. Burial beneath overlying sediments increases temperature and pressure. Over time, these factors transform peat into lignite, then bituminous coal and then anthracite. This process is simplied as modeled in Figure 8. The coalification process moves towards formation of graphite, that is, the most thermodynamically stable form of carbon.

4.2 *Coal Rank.* As the coalification process progresses, coal increases in rank. For example, lignite is

more "mature" and of higher rank, than peat. Bituminous coal is more mature and of higher rank than lignite. Anthracite is more mature and of higher rank than bituminous coal. The coals in the Fruitland formation underlying the Southern Ute Indian Reservation are bituminous coals.

4.2.1 As coal rank increases, the content of certain elements within the coal changes. As coal matures, carbon content increases, hydrogen content decreases and oxygen content decreases.

4.2.2 As coal matures, i.e., as rank increases, methane content also increases. Stated another way, as a general rule, the higher the rank of the coal, the higher the methane content will be, as set out in Figure 9.

4.3 *The Generation of Molecules of Water and Methane within Coal.*

4.3.1 The chemistry of coalification creates water and methane molecules internally within the coal. The space these generated molecules occupy within the coal will be slightly larger than the space the constituent atoms occupied when previously attached to the macromolecular network. Thus, there must exist within the coal high internal generative pressures, matching the tectonic and overburden pressures on the coal seam. Usually, most of the generated methane stays within the coal for the entire coalification period. Before mining, the coal contains no unfilled microporosity. This microporosity, in mined and desorbed coal, is created by the methane and is the volume it occupied during coalification. If the methane had desorbed during coalification it can be strongly suggested that the macromolecular structure would have densified further and would not contain microporosity.

4.3.2 The same processes of coalification that produced coal macerals produced coalbed methane and water.

4.3.3 Coalbed methane was derived from the same organic substances that gave rise to coal macerals.

4.3.4 The coal generates water and methane in excess of its ability to contain all of these compounds within itself. Some methane is lost to the surrounding strata. But at pressures of about 1,000 atmospheres, about 80% of generated methane can still be retained within the coal.

4.3.5 In terms of geological time, say 100,000,000 years, there is time enough for the methane to diffuse out of the coal into surrounding porous strata, provided the strata is porous (permeable). The fact that it does not indicates (a) that the methane is essentially sealed within the coal itself, or (b) that the surrounding strata are totally impermeable. The former is the most probable.

4.3.6 So, methane generated within coal stays there forever unless a major disturbance occurs, either geological or man-made.

4.3.7 In one sense, the methane is dominantly "gridlocked" within the coal structure. It cannot move to an adjacent microporous site (diffusion) because all adjacent sites are themselves occupied at all times. Stated another way, coalbed methane is located primarily within the macromolecular structure of macerals.

4.3.8 The locations of moisture (water) within coal are similar to those of methane.

4.3.9 Methane in coal could not have originated from a source rock some distance from the coal seam, and later have become adsorbed within the coal.

4.3.9.1 To do so, the methane pressure in that source rock must have been higher than the pressure of methane in the coal seam.

4.3.9.2 There must have been a single direction of movement from the source rock to the coal seam. There must be no other random diffusion pathways.

4.3.9.3 There must be access to the coal seam, from the source rock, over areas of many square miles.

4.3.9.4 The coal seam must have lost its methane previously in order to have an available adsorption capacity for methane from a rock source.

4.3.9.5 But having lost its adsorption capacity in the first place it will not change to become a methane-retaining coal. If the methane subsequently cannot come out, it could never have gone in, in the first place.

5. *Coal Structure.*

5.1 Coal is an agglomerate of physically held materials. These agglomerated materials include:

5.1.1 Macerals

5.1.2 Mineral matter

5.1.3 Moisture

5.1.4 Gases (including methane, carbon dioxide and hydrogen sulfide)

5.2 Coal is not composed of a single chemical compound. Rather, it is a eterogenous substance made up of many different types of organic chemical materials, some of them quite complex. Not all the constituents of coal are covalently or ionically (chemically) bonded to one another. Many of the constituents of coal are bound together by physical, not chemical, forces. The structure of coal cannot be fully understood if one ignores its macromolecular, heterogenous nature. Likewise, coal cannot be understood if one ignores the role of physical bonds in its structure and composition.

5.3 *Structure in Atoms and Molecules.*

5.3.1 Small atoms such as helium, argon, etc. behave as though they were small magnets, and can attract each other. These attractions are small compared to some other types of bonds

and are the Van de Waals' forces. In such atoms the polarity of the magnets is not constant, but oscillates very rapidly. These oscillations do not cancel totally and all atoms and molecules possess this 'residual' type of interaction, see Figure 10.

5.3.2 Other molecules, such as nitrogen (N_2), possess two magnets within their structure and these are known as quadrupoles. The forces between these molecules are stronger than for the atoms of helium or argon. In the presence of force fields from other molecular systems dipoles and quadrupoles can be induced in some molecules, for example carbon dioxide, see Figure 11.

5.3.3 On the other hand, some molecules have dipoles which are permanent within the molecule. Two simple examples, but of overwhelming importance to the existence of life, are water and ammonia. The dipole of the water molecule creates 'polymeric', or cage-like water structure which maintains the liquid phase, see Figure 12.

5.4 *Bonding Between Atoms and Molecules.*

5.4.1 *Chemical v. Physical Bonds. Chemical bonding* involves electron transfer or sharing atom with atom. They are the strongest of the bonds. *Physical bonding* is the least energetic of bonding or attraction between atoms and molecules. It results solely from the above mentioned van der Waals' forces. No electrons are transferred or shared. As an example, using water, H_2O, there is chemical bonding between the hydrogen and oxygen atoms (electron sharing). The bonding or attraction between the water molecules themselves (resulting in liquid water or ice) is physical in nature.

5.4.2 *Covalent Bond.* Primary chemical bond formed by the sharing of electrons of the bonded atoms such as the carbon atoms in graphite or diamond. Such bonding is characterized by strong directional bonding. Bond energies are >200 kJ mol^{-1} (>50 kcal mol^{-1}).

5.4.3 *Ionic Bond.* Primary chemical bond formed by the transfer of electron(s) from the shell of one atom to the shell of a second atom, the atoms being of widely differing electronegativities. Such bonding is characterized by a lack of directional bonding. Bond energies are >200 kJ mol^{-1} (>50 kcal mol^{-1}).

5.4.4 *Hydrogen Bond.* Secondary valence bond between a hydrogen atom in one molecule and oxygen, nitrogen or fluorine atom in another molecule (intermolecular bonding). These bonds may also exist between hydrogen atoms in one location and oxygen, nitrogen, or fluorine atoms in another location in the same molecule (intramolecular bonding). Intermolecular hydrogen bonds are responsible for the high strength of fibers, of polymeric types of materials and for the stability and functioning of life molecules. Bond energies are <40 kJ mol^{-1} (<10 kcal mol^{-1}).

Hydrogen bonding is secondary bonding and involves no electron transfer as in primary bonding (covalent or ionic). Intermolecular hydrogen bonds are responsible for the high strength of fibers. An example of intramolecular hydrogen bonds is the helices found within organic molecules like starch and globular proteins (life molecules).

5.4.5 *London Forces or Dispersion Forces.* Secondary transitory dispersion forces resulting from induced dipole induced dipole interaction. London or dispersion forces are secondary forces and involve no electron transfer, see Figure 10.

5.4.6 *van der Waals' Forces.* Forces based on attractions between groups in different molecules or in different locations in the same molecule. This term is not used rigorously. Rather it is often used to include all types of physical bonding, dispersion forces, quadruple, and dipole interactions and hydrogen bonding (which is a form of dipole interaction). In graphite the carbon atoms within a plane are bonded chemically, covalently. However, the layers are bonded between themselves by a form van der Waals' bonding, by interaction of the π-electron orbitals, without electron transfer. This weak bonding allows the layers of graphite to slip over each other. Hence, graphite is a lubricant.

5.4.7 *Bond Lengths.* Bond length is the distance atom center to atom center. The bond lengths of primary bonds are usually about 0.09 to 0.2 nm (0.90 to 2.0 A[2]), with, for example, the carbon-carbon bonding length being about 0.15 to 0.16 nm (1.5 to 1.6 A). With secondary bonding, interactions occur over distances of 0.25 to 0.5 nm (2.5 to 5 A).[3]

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[2] The symbol "A" is for angstrom. An angstrom is one hundred-millionth of a centimeter.

[3] It should be borne in mind that the size of microporosity is less than 2 nm in width. Thus, the largest micropore is only 4 to 8 times greater in diameter than the length of a hydrogen bond and as little as 10 times greater in diameter than the length of a covalent or ionic bond.

5.5 Bituminous coal macerals consist of three-dimensionally cross-linked macromolecules. The building blocks of these macromolecules are aromatic rings. Aromatic rings consist of six carbon atoms bound in a hexagonal shape with a hydrogen atom bound to each carbon atom. A common aromatic ring is benzene (molecule (IV), page 4). Two or three aromatic rings join together to form an aromatic ring cluster. These aromatic ring clusters are connected by aliphatic carbon bonds into a disordered macromolecular network with incomplete filling of spaces between the systems (see Figures 13 through 19). These spaces are microporosity.

5.6 It is necessary to consider coal as being macromolecular in nature.

5.7 The macromolecular structure of vitrinite is not homogenous throughout. There appear to be variations in intensity of bonding throughout the macromolecular structure. These variations in bonding intensity or atom density or microporosity occur continuously over distances of nanometers. Above this, an individual maceral shows variations over much longer distances, of micrometers, associated with origins from different parts of the plant material. As water and methane molecules are products within the structure at positions of their formation, they prevent the macromolecular structure from becoming more stable, more homogenous, and more dense. In other words, water and methane molecules are not simply separate or additional products of coalification. They have a prime role in influencing the development of the macromolecular structure. Water and methane molecules originated from the same macromolecular structure of the precursors of coal macerals. They remained within and influenced the development of macromolecular structure of bituminous coal macerals.

5.8 A two-dimensional model of the macromolecular system of a coal maceral is shown in Figure 13 (Shinn model). A three-dimensional model is shown in Figure

14 (Spiro model). It must be borne in mind that there is no "average" maceral molecule because coal is so heterogenous in structure. Thus, any model radically oversimplifies the molecular and structural heterogeneity of coal macerals.

5.9 Figure 15 is the two-dimensional Shinn model of the macromolecular system of a coal maceral with some aromatic ring clusters highlighted.

5.10 Figure 16 is the two-dimensional Shinn model of the macromolecular system of a coal maceral with the structural chemical composition of the surface of the microporosity highlighted.

5.11 Figure 17 is the two-dimensional Shinn model of the macromolecular system of a coal maceral with the porosity highlighted.

5.12 Covalent bonds exist within the macromolecular structure of coal macerals. However, non-covalent physical interactions are important components of the chemical structure of coal macerals.

5.13 Figure 18 is a simple three-dimensional model of a macromolecule of a coal maceral to illustrate that the bonding between the molecular structure is not intense. Further, the bonding is dominantly of two forms. There are the strong directional covalent bonds between atoms. There are also the non-directional hydrogen bonding between hydrogen and other components of coal.

5.14 Figure 19 is a model of the macromolecular structure of a coal maceral (generated using computer graphics) using the space-filling technique to indicate relative positions of hydrogen and carbon atoms, etc. Because the packing is not close, the microporosity is within this model, but not easily seen.

5.15 Figure 14 (Spiro model) shows a portion of the structure of the macromolecular structure of a coal maceral. If many of these portions were stacked together, the

resulting imperfect stacking would create the microporosity.

5.16 The bonding density within the macromolecular structure of coal macerals is not high; there is flexibility, limited rigidity, such that the structure can be manipulated.

5.17 Water in coal is a structural component. Removing water from coal changes structure and bonding. This concept is introduced in section 4.3.1. Water molecules and coal are located at positions of oxygen functionality within the macromolecular structure where the forces (energies) of physical adsorption are highest. When water is removed from the coal, either by warming or by evacuation, the macromolecular structure collapses on to itself, and will further bond within itself by hydrogen bonding and chemical bonding at locations previously occupied by the water molecule. This new bonding is irreversible. Hence, mined and dried coal is a different material compared with the unmined coal still with its inherent moisture.

5.18 Water exists in coal in several states:

5.18.1 As physically adsorbed in microporosity the surfaces of which is free from groupings capable of forming hydrogen bonds.

5.18.2 As physically adsorbed in microporosity the surfaces of which contain various groupings capable of forming hydrogen bonds.

5.18.3 As water derived from the chemical decomposition of oxygen-containing groups on the macromolecular surface (e.g., OH- radicals). This water is not "chemisorbed" in the proper sense because it does not exist as water in the first place.

5.18.4 As water of hydration associated with the mineral matter in coal, e.g., clays.

5.18.5 As bulk water outside the microporosity but within fractures of the coal, or other porosity in the coal greater than 50 nm in width. The properties of this water are essentially those of water as seen in a glass, for example.

5.19 Hydrogen bonding, usually between atoms and oxygen atoms, of the order of < 40 kJ mol^{-1}, is extensive. As with proteins and other polymeric (macromolecular) systems, e.g. cellulose, lignin, the stability of structure is established by many hydrogen bonds (of low energy) as distinct from few covalent bonds of high energy, relatively.

5.20 Methane in the microporosity of coal macerals was generated and influences macromolecular structure in fundamentally the same ways as water does. Both interact with the macromolecular structure in the same ways. In other words the nature of the interactions between methane and water and the macromolecular structure of coal macerals is fundamentally the same. The only difference is in the energetics of those interactions. Water is more interactive with the macromolecular structure than is methane.

5.21 A coal maceral, e.g. vitrinite, is macromolecular in nature. But it is not homogenous. Parts are more strongly bonded together, physically and chemically, than other parts. This is true for all levels of heterogeneity, e.g., between components of vitrinite associated with different plant component origins. This type of heterogeneity shows up by selected chemical, analytical techniques, e.g. nuclear magnetic resonance (NMR). The differently bonded components are called immobile (strongly bonded) and mobile (weakly bonded) phases. The weakly bonded phases can be extracted by solvents. Some of these weakly bonded phases may in fact behave as individual molecules, not part of the macromolecular chains, and are called oils.

5.22 *Comparing Coal* in situ *with Coal in a Laboratory*. It is not scientifically acceptable to take the results

and conclusions of coal experiments conducted in a laboratory and apply them uncritically to the *in situ* situation of coal in a coal seam. Bituminous coal seams typically exist at temperatures of about 80°C and pressures up to about 1,000 atmospheres (100 MPa). Under these conditions, there is very little volume of free methane. The conditions of moisture and methane within *in-situ* coal are unique to this undisturbed state. It is well established that removing moisture from *in-situ* coal brings about a change in coal structure which cannot be restored, see section 5.17. Therefore, moisture in in-*situ* coal is NOT in equilibrium with moisture external to the coal as it would be in a laboratory experiment. This is because the structure/bonding within the two coals is now different. The physical conditions of a laboratory coal adsorption experiment do not simulate the conditions in a coal seam. First, the moisture and methane in *in-situ* coal were generated along with and as part of the macerals. This generation is an irreversible process. Second, removal of moisure and methane from coal as it is removed from a coal seam is an irreversible process. Third, the physical conditions of a laboratory adsorption experiment with its large volume of available gaseous adsorbate, and the use of a tiny sample of coal (0.1 gram) do not simulate the conditions in a coal seam. In a laboratory experiment, the diffusion conditions differ significantly from those in a coal seam.

5.23 Studying the structure of coal reveals it to be an extremely complex and heterogenous material. The various substances which comprise coal are primarily physically bonded together. Thus, if one were to remove from coal all materials which are physically bonded into it, in the end nothing would remain.

5.24 A microscopy examination has been made of a core sample of Valencia Canyon coal from the San Juan basin in Colorado. The report of this examination, including micrographs and explanatory notes, is attached to this Affidavit as Exhibit 2.

The bulk fracture surfaces of this coal were initially photographed, and color photographs obtained. The coal was micronized (ground) to a size of less than about 10 μm. This sized coal was then subject to the process of density gradient separation using the centrifuge approach. The ground coal is made into a slurry with a solution of cesium chloride, with a density of 1.18 g cm^{-3}. As the macerals within coal have different densities, then the heavier (more dense) fraction will tend to sink to the bottom of the slurry and the lighter (less dense) fraction will float. Left to settle out without the influence of centrifugal forces, the separation process would take an impossible long time.

Therefore, the slurry was placed into centrifuge tubes and subjected to a centrifugal separation, *i.e.*, a process of spinning. After an appropriate time the heavier component moved to the bottom of the tube and that fraction of lower density stayed further up the tube. Hence, the coal can be separated into two fractions by selective siphoning. These fractions are called:

FLOAT: Density less than (<) 1.18 g cm^{-3}, made up of the liptinite (resinite, sporinite) macerals.

SINK: Density greater than (>) 1.18 g cm^{-3}, made up of the maceral vitrinite.

Scanning Electron Microscopy (SEM)

The particles of coal, after micronization, were examined by SEM. This form of microscopy images the three-dimensional appearance (shape) of the particles and these can be photographed in black and white. Both the float and sink particles were so photographed, at a microscope mignification of 5,000x. The print magnification is 10,000x.

Optical Microscopy.

This technique examines polished surfaces of the coal using polarized light, both white light and U.V. fluorescent light.

Because different macerals reflect white light differently, then the macerals within the coal surface are clearly distinguished from each other, in terms of shades of gray.

Using the conditions which generate fluorescence within the coal sample, then such macerals as resinite, because they fluoresce with a yellow/orange light, are clearly distinguishable from vitrinite, which does not fluoresce.

Polished surfaces were prepared from:

(a) pieces about 1 cm in size, of the unground coal,

(b) particles of the float fraction,

(c) Particles of the sink fraction,

Images as seen within the microscope were photographed using 200 ASA Kodacolor film and color prints obtained and reproduced within this report (Exhibit 2). The many components of coal are clearly visible. The print magnification is 600x.

Low Temperature Ashing

The objective of this experiment was to obtain a sample of the mineral matter as it exists within the coal particles. The micronized coal was placed within a LOW TEMPERATURE ASHING FURNACE and oxidized in atomic oxygen. This gas oxidizes (burns) the organic matter of the coal and leaves behind the mineral matter as it exists within the coal, without change. It is obtained as very fine brownish powder. It was subject to an X-ray examination and found to be made up of quartz and clay, primarily.

A further sample of the mineral matter was examined by SEM and its shape or morphology photographed as reproduced within this report.

The samples of bulk coal, micronized coal, coal macerals, and mineral matter constitute Exhibit 3.

6. *Adsorption of Coalbed Methane.*

6.1 Physical adsorption, or physi-sorption, is a process whereby a solid surface "attracts" molecules to that surface by physical forces to create a concentration there much greater than in the absence of the surface. See Figures 20a, 20b. Examples of the physical forces which may be involved in physical adsorption are hydrogen bonding and van der Waals' forces.

6.2 Chemical adsorption, or chemi-sorption, is a process whereby a solid surface "attracts" molecules to that surface by chemical forces to create a concentration there much greater than in the absence of the surface. Examples of the chemical forces which may be involved in chemical adsorption are covalent and ionic bonds.

6.3 Figures 21a, 21b illustrate some basic definitions. Adsorptive, usually a gas, is this substance before it is absorbed, being still in the gas phase. Adsorbent is the substance which adsorbs, e.g., a solid. Adsorbate is the substance which is adsorbed, e.g., a liquid or gas.

6.4 Smooth solid surfaces are not of interest to chemists who study adsorption. That is because smooth surfaces are rare. Figure 22 illustrates adsorption on an irregular surface.

6.5 Smooth solid surfaces do not exist in coal. Coal involves adsorption on irregular surfaces. Most of the surface area within coal is the surface of the microporosity.

6.6 Physical adsorption can result in multiple molecular layers of adsorbate attached to the surface of the adsorbent. Chemical adsorption can result in only a single layer of molecules of adsorbate attached to the surface of the adsorbent.

6.7 Coalbed methane is adsorbed to the surface of the porosity in coal macerals by the process of physical adsorption. The physical bond involved in adsorption of methane in coal is van der Waals' forces.

6.8 Adsorbed water also exists in coal. The physical bond involved in adsorption of water in coal is hydrogen bonding. This hydrogen bonding may be strong enough that some chemists, e.g., Douglas Smith, describe it as "chemisorbed water". However, hydrogen bonding never involves the sharing of electrons and, therefore, can never constitute a primary bond. Apparently, Dr. Smith uses the phrase to denote that adsorbed water may be strongly bonded in the coal.

6.9 Adsorbed coalbed methane does not behave as a free gas. Because of the increased concentration and pressure in a coal seam, the density of the methane in the coal may approach that of liquid methane.

6.10 Figure 17, Shinn model, shows the location of microporosity within the macromolecular structure of a coal maceral. The coloring shows that the microporosity is essentially the spaces between the structural units of the macromolecular structure of coal macerals. An essential feature of this microporosity is that no two micropores are likely to be identical. In one gram of coal there could as many as 10^{21} micropores. There will thus be a range of size, shape and energetics of adsorption. It is within these micropores that methane was formed and retained during the coalification process. It is within these micropores that methane is adsorbed.

6.11 An adsorbent and adsorbate are, by definition, different chemical compounds. However, adsorption creates a bonding system of which both the adsorbent and the adsorbate are constituents.

6.12 Both physical and chemical adsorption create systems of attachment or bonding. In each, the adsorbent and adsorbate are constituents of that system. It would

not make scientific sense to distinguish whether an adsorbate is a constiutent of such a system on the basis of whether the adsorption is chemical or physical. Likewise, it would not make scientific sense to distinguish whether an adsorbate is a constituent of such a system on the basis of whether the mechanism of attachment is hydrogen bonding or van der Waals' forces. The fallacy of such a distinction is illustrated by considering enthalpy of adsorption.

6.13 *Ethalpy (Heat) of Adsorption.*

6.13.1 Heat of adsorption, $(\triangle H)_a$, is defined as the heat (energy) liberated when one mole of an adsorbate (from a standard state) is adsorbed on an adsorbent. Units used are kcal mol^{-1}, or kJ mol^{-1} (1 kcal = 4.2 kJ. Values of $(\triangle H)_a$ vary (decrease) as the adsorbate progressively covers the surface of the adsorbate (θ = fraction of surface covered).

6.13.2 The experimental function used to differentiate between the bonding processes is the *heat of adsorption* $(\triangle H)_a$. If one examines values of $(\triangle H)_a$ for different systems it becomes apparent that an arbitrary distinction based on chemical vs. physical bonding or on hydrogen vs. van der Waals' forces does not make sense. In any given adsorption system, there exists a range of heats of adsorption, decreasing with increasing surface coverage. Heat of adsorption is a function of the adsorbate and the surface chemistry and porosity of the adsorbent. Making such an arbitrary distinction would have to mean that for adsorption giving $(\triangle H)_a > X$ kcal mol^{-1} then the adsorbate is part of the system: but for $(\triangle H)_a < X$ kcal mol^{-1}, the adsorbate is NOT part of the system. If such a distinction were applied across the field of adsorption chemistry, because of such wide variations and overlap in heats of adsorption system to system, then the application of this distinction would be totally arbitrary and without meaning.

6.14 There is no quantitative break-point as to where hydrogen-bonding ends and non-hydrogen-bonding begins.

6.15 Values of $(\triangle H)_a$ from the literature include:

System	$(\triangle H)_a$/Kcal mol^{-1}
n-Octane on a carbon	17
Water on Yallourn brown coal	15-10
n-Heptane on a carbon	15
n-Hexane on a carbon	13
Benzene on silica	12
n-Pentane on a carbon	10
Nitrogen on rutile	6
Methane on coal	5.3
Nitrogen on a carbon black	4-1.7

The above list indicates, most clearly, the wide range, 1.7 to 17 kcal mol^{-1}, of heats of adsorption for PHYSICAL ADSORPTION (all types of van der Waals' adsorption, section 5.4.6).

6.16 Hence, what *is* or *is not* part of coal cannot be decided, under any circumstances using comparisons of heats of adsorption or any other form of comparison of the energetics of the physical bonding process.

6.17 Desorption of coalbed methane from a coal seam is *not* a reversible process. One cannot put back into the coal anything close to the amount of the coalbed methane one can remove from the coal. However, in a laboratory environment, adsorption and desorption of methane on a coal sample are reversible processes.

6.18 Coalbed methane and water removed from coal, using current technologies, principally by drilling into the coal seam, reducing the pressure, and creating a pressure gradient toward a well bore. This is a physical process. However, many of the constituents of coal may be separated from the others using physical processes. For example, mineral matter may be washed out of coal. Water may evaporate from coal. Solid coal macerals may also

be separated from the coal by alterations in pressure and travel up a coalbed methane well bore. The fact that physical forces may be used to separate constituents of coal does not contribute to the debate as to whether or not a particular substance is part of coal. Rather, the debate must focus attention to the entire coalification process.

7. *Coal Utilization.*

7.1 There may be a present misconception among the lay public that coal is now, and has always been, a single purpose resource, i.e., that its sole use is to be burned as a solid fuel. In fact, for a large portion of the chemical industry from the mid-1800's, and was converted into a wide multi-purpose resource. For example, coal has been used as a source for fuel gas since the early 1800's. The technology has existed for sixty years to convert coal to liquid fuels. Coal tar was used as the raw material for a large portion of the chemical industry from the mid-1800's, to be were converted into a wide range of products, e.g., drugs, explosives, plastics, fibers, film, pesticides, paints, rubber, etc.

7.2 *Gas From Coal.* From about the 1880's until the mid-1960's, depending on the country being considered, a substantial percentage of coal was used for the production of coal-gas or town-gas . This gas was used for both lighting and heating. Like the coalification process, making gas from coal involves decreasing the amount of hydrogen and oxygen in the coal and increasing the percentage of carbon. The end product of carbonization/gasification processes is coke. Coke has a very high carbon content. As mentioned above, the theoretical end product of the coalification process is pure carbon in the form of graphite. Thus, the human generated activity of carbonization is similar in some respects to the geologic process of coalification only it occurs over a much shorter time period and at higher temperatures. Currently, about

10% ot coal production goes to carbonization ovens for the production of metallurgical coke for use in blast furnaces used in the iron and steel industry. The production of coke also produces coal-gas. This coal-gas is used as a fuel gas by the steel industry.

7.3 *Underground Gasification.* Underground gasification is the production of fuel gases from an underground coal seam using a combination of oxidation and carbonization processes. The technology involves igniting an underground coal seam, injecting steam, air or oxygen and withdrawing the fuel gases that are produced.

7.4 *Coal Liquefaction.* The macromolecular structures of coal, being aromatic in nature, depending on rank, are a potential source of liquid fuels, also aromatic in nature, e.g., gasoline. The straightforward carbonization of coal (heating in an inert atmosphere) produces liquid hydrocarbons which can be fractionated to give gasoline-like fractions. The United States explored coal liquefaction processes following the 1973 oil embargo. During World War Two, Germany produced its aviation gasoline from coal.

7.5 *Coal Tar.* A wide variety of liquids and gases can be produced from coal. Historically, coal tar has been used as the raw material from which a wide variety of products have been made. Today, distillates of coal tar are being used in a wide variety of advanced technologies. For example, coal-tar pitch is one substance resulting from the distillation of coal-tar. It is used in the production of carbon anodes for aluminum production, for graphite electrodes for steel production, and for a wide range of electrodes. Further, it is used in the fabrication of composites, with carbon fibers, and has several uses in the space industry.

7.6 Coal has been a multi-purpose resource for a very long time. The technologies of coal utilization continue to develop and diversify. Economic factors influence the

extent to which existing technologies of coal utilization are actually used and the rapidity with which new technologies of coal utilization are developed.

8. *Conclusions.*

8.1 Coalbed methane, being one of the several products of coalification, cannot logically be considered as being in any way different from the other products of coalification. Coalbed methane originated from the same materials from which coal macerals originated. Coalbed methane is located in the same place as coal macerals are located. Coalbed methane is found within the macromolecular structure of coal macerals. Coalbed methane is bonded to the macromolecular structure of coal macerals by the same physical process that binds water to the structure of coal macerals. Water is generally regarded as a structural component of coal.

8.2 Coal is a complex and heterogeneous substance. Coalbed methane is one of the substances that make up coal's heterogeneity.

FURTHER AFFIANT SAYETH NAUGHT

/s/ Harry Marsh
DR. HARRY MARSH

[Notary Omitted]

Hon. Thos. M. Carter,

St. Paul, Minn. Feb. 21, 1910.

Dear Sir:—

Permit me to call your attention to some matters of interest to your constituents concerning the U. S. Land Department with reference to lands in Montana. I write this at the request of numerous parties situated in Eastern Montana where it seems to us that the over-worked conservation schemes of U. S. Government is about to, if it has not already, swollowed a large portion of the best agricultural lands in the state of Montana by a report, purported to have been made last fall, wherein the Department has withdrawn from entry many thousands of acres on the most fertile lands in our state under a coal classification and it is reported that only 20-dollar coal filings will be accepted in the local land office, wherein such lands are situate. It seems to us and we know no reason why that the local land offices should not accept homestead filings or D. L. filings on these lands, subject to the reserve of the coal by the Government and also be permitted to go to final proof, with coal reserve. While I have not personally read the report from which this order was made, I understand that it was claimed by said report that the coal was not of any present commercial value, yet intimated that possibly it might be of value for gas away down in the remote ages. It is possible that the Department has made such orders pending a field examination of lands so classified but we of Montana are certainly getting very tired of the long-drawn out red-tape actions delaying the immediate settlement of our State and feel to insist that some relief from such wholesale grabbing of our public domain from the thousands of Entrymen, looking to Montana for homesteads and we generally expect the greatest immigration into the state this year ever witnessed but if you will get from the Land Department, its latest map of Montana showing the coloring of coal lands, withdrawn from entry, pending some further examination etc., you will be surprised, while in

addition to that I enclose a clipping wherein there has been a recent order made which withdraws high entry pending field examination for coal *60,000 acres in Montana. (Enclosed clipping). The people generally believe in conservation but it seems to tie up by one order or another from the Department at Washington the best of our lands pending an examination which means untold delays. The people generally feel that the Government with its forest reserves, well, the blue coloring on the new map will speak volumes to you. These delays on the part of the Government, you are certainly aware will during the present year be the means of sending thousands of people into Canada where homes can be obtained more readily.

I especially request of you to look up, if convenient, and find where the trouble lies with reference to the U. S. Survey made in Fall of 1907 for township 27 E. of R. 53 E., M.P.M. The plats of said survey have not as yet been turned into the local Land Office. There are many settlers, and in fact all the available land, suitable for agriculture in this township would be promptly filed on, were the plats filed and land opened for filing. About three and half years since survey was made. In calling your attention to the above matters, I do so as your personal friend having known you and lived in Montana since '86, hoping that you can find time, to kindly let me hear from you that I may make it plain to inquiring settlers in my community. With best wishes, I am Most truly your friend,

/s/ John H. Simpson
Formally of Butte but now
of Brocton, Montana.

No. 98-830

In The Supreme Court of the United States

October Term, 1998

Amoco Production Company, on behalf of itself and the class it represents,*

Petitioners,

v.

Southern Ute Indian Tribe,

and

Bruce Babbitt, Secretary of the United States Department of Interior, *et al.*,

Respondents.

On Writ of Certiorari to the United States Court of Appeals for the Tenth Circuit

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JOINT APPENDIX
VOLUME II

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PETITION FOR CERTIORARI FILED: NOVEMBER 18, 1998
CERTIORARI GRANTED: JANUARY 22, 1999
ORDER GRANTING CERTIORARI AMENDED: JANUARY 29, 1999

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Papers on the Conservation of Mineral Resources, U.S.G.S. Bulletin 394, H.R. Doc. No. 1554, 60th Cong., 2d Sess. (1909) 473

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Phillip J. Wilson and J.H. Wells, *Coal, Coke, and Coal Chemicals*, Chemical Engineering Series (1950) 527

Harry Perry, *The Gasification of Coal*, 230 *Scientific American*, No. 3 (Mar. 1974) 530

Robert A. Myers, *Coal Handbook* (1981) 543

William F. Clark and Tom Hemler, *Completing, Equipping, and Operating Fruitland Formation Coal-Bed Methane Wells in the San Juan Basin, New Mexico and Colorado reprinted in* James E. Fasset, *Geology and Coal-Bed Methane Resources of the Northern San Juan Basin, Colorado and New Mexico*, Rocky Mtn. Ass'n of Geologists (1988) 553

Jeffrey R. Levine, *Coal Composition, as Related to the Mode of Occurrence of "Coalbed Methane"* (1992) 579

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The following documents have been omitted in the printing of this Joint Appendix. They are reproduced in the Appendix to the Petition For A Writ Of Certiorari on the pages indicated below:

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H. Department of Interior, Department Manual 209 DM 178a

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59TH CONGRESS
2d Session

DOCUMENT
No. 823

HOUSE OF REPRESENTATIVES

Bulletin No. 316

Series—A. Economic Geology, 98
B. Chemistry and Physics, 51

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

CONTRIBUTIONS

TO

ECONOMIC GEOLOGY

1906

Part II.—COAL, LIGNITE, AND PEAT

MARIUS R. CAMPBELL
Geologist in Charge

WASHINGTON
GOVERNMENT PRINTING OFFICE
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CONTRIBUTIONS TO ECONOMIC GEOLOGY, 1906, PART II.

COAL, LIGNITE, AND PEAT.

MARIUS R. CAMPBELL, *Geologist in Charge.*

INTRODUCTION.

By MARIUS R. CAMPBELL.

NEED OF INVESTIGATION.

The constantly growing consumption of coal in the United States has led to the opening of mines in almost every State in the Union and it has also stimulated prospecting to a marked degree. This condition of affairs has created a strong demand for information concerning the extent of the coal fields, the geologic relation of the beds, and the quality of the coal. In the comparatively unknown coal fields of the West the demand is for general information regarding the extent, number, and thickness of the beds and the quality of the coal. In the better known fields the demand is for detailed information which will enable the prospective operator to know how much of any one coal bed is available, and how it lies, so that he may locate his mine in the best position for economic work.

In order to meet this growing demand the Geological Survey has been giving more and more attention to the subject of coal, both as regards its geologic relations and its technology. The need for information in both branches is imperative, for, although the amount of coal in the various fields seems so great as to be well nigh inexhaustible, the consumption is increasing so rapidly that already the question of a future supply of fuel is a serious one and the Government is surely justified in using every means possible to conserve the supply for the use of future generations. Accordingly the technologic branch of the Survey is engaged in studying the fuel problems in order to devise, if possible, less wasteful methods of mining and more economical methods of utilizing the coal after it is mined.

Our chief fuels are coal, oil, and wood. Wood already is almost a thing of the past; oil, although used extensively in some parts of the country for the production of power, is necessarily of limited occurence and before long may cease to be an important factor in the problem. Coal, therefore, is the fuel of the present, and, so far as can be seen, will continue to lead in this particular for a long time to come.

The importance of the coal industry at the present time is well illustrated by a comparison of the values of the leading mineral products of the United States for the year 1905.

Values of six of the leading mineral products of the United States in 1905.[a]

Coal	$476,756,963
Iron	382,430,000
Clay products	149,687,188
Copper	139,795,716
Oil and gas	125,720,254
Gold and silver	122,402,683

[a] Mineral Resources U.S. for 1905, U.S. Geol. Survey, 1906.

So far as fuels are concerned the work of the Geological Survey may be divided into three classes—geologic, technologic, and statistical, the last of which is in charge of the division of mineral resources. The object of this report is to give, in a brief way, a synopsis of the results accompanied in the various branches of the work during the last year in advance of the more detailed reports covering the same subjects.

GEOLOGIC WORK.

All geologic work on the mineral fuels of the United States is under the general supervision of the writer. The work is of various grades and degrees of precision, depending on the needs of the public and the condition under which the surveys are carried on.

In that part of the country west of the 100th meridian the coal fields are comparatively unknown, and the work of the Survey is largely exploratory. Rapid reconnaissance surveys are made over large areas to determine the limits of the field and to obtain such information regarding the number and character of the coal beds and their attitude as may be possible in the present undeveloped condition of the field and with the hasty method of examination. Where the outlines of the fields are already fairly well known the work is largely devoted to a more or less detailed investigation of the number and thickness of the coal beds, the quality of the coal, and the best locations for economical development of the field.

In the eastern fields information is needed almost as badly as in the West, but the work is of a much more detailed character and involves not only a thorough study of the geologic conditions under which the coal occurs, but also a study of the quality of the coal and its adaptability to various commercial uses.

The reports here presented cover results obtained wholly or in part during 1906. Geologic work has been done in the various States as follows:

Pennsylvania.—Since 1900 the examination of the Pennsylvania coal field has been carried on through the cooperation of the State and Federal authorities, but the field work has been done entirely by the geologists of the United States Geological Survey. In this time very detailed surveys have been made of most of the Pittsburg coal region of the southwest corner of the State, of a large area in the eastern part of the bituminous coal field in Indiana, Cambria, and Clearfield counties, and a part of the Allegheny Valley, embracing an area of about 5,000 square miles.

All coal work in this State is under the general direction of George H. Ashley, who was assisted during the past year by W. C. Phalen, Edwin F. Lines, M. J. Munn, and Frederick B. Peck. Surveys were carried on in Cambria, Clarion, and Allegheny counties, and some of the results are given in this volume in papers entitled "Coal in the Clarion quadrangle, Clarion County, Pa.," by E. F. Lines, and "The coal resources of Johnstown, Pa., and vicinity," by W. C. Phalen.

Virginia-Kentucky.—A reconnaisance survey was made of a district in the central part of the Appalachian field under the general supervision of George H. Ashley. The building of a new branch line from the Chesapeake and Ohio Railway up Russell Fork of Big Sandy River to the Virginia line and the beginning of construction of the South and Western Railroad from the end of this branch to the Atlantic coast promises to open in the near future one of the largest and best tracts of coal land in the central Appalachian region. In order to be able to furnish information on this interesting and economically important region, a detailed reconnaissance was made by Ralph W. Stone, assisted by C. W. Dodge, on both sides of the Virginia-Kentucky State line, and the more important results will be found in three papers in this bulletin by Mr. Stone entitled "The Elkhorn coal field, Kentucky," "Coal mining at Dante, Va.," and "The Russell Fork coal field, Virginia."

Alabama.—For several years Charles Butts has been engaged in a close, detailed survey of the coal fields in the vicinity of Birmingham, including much of the Warrior basin. During the past year Mr. Butts was assisted by Chester W. Washburne, and the work was carried to the east into the Cahaba coal field. Time did not permit the survey of the entire field, but the northern part was examined thoroughly, and a brief account of the results of this work may be found in a paper by Mr. Butts entitled "The northern part of the Cahaba coal field, Alabama."

Illinois.—In Illinois the examination of the coal field is carried on both by the State Geological Survey and by the Federal organization, with the understanding that each shall supply to the other manuscript reports on the area or areas investigated. During the last year the work of the Federal Survey was confined to two 15-minute quadrangles in Gallatin, Saline, White, and Hamilton counties, and the results are embodied in a paper in this volume by Frank W. De Wolf entitled "Coal investigations in the Saline-Gallatin field, Illinois."

Arkansas.—A demand for more detailed information regarding the Carboniferous coal field of Arkansas than is contained in the reports of the State Geological Survey led the Federal organization to make an examination of this field in the early part of the past summer. The work was done by Arthur J. Collier, assisted by Carl D. Smith, Sidney Paige, and R. D. Mesler. This work is of especial value, inasmuch as it has established the identity of the principal coal beds at the east and west ends of the field, and has thrown considerable light on the distribution of the workable coals, a point that has been troubling the operators for a number of years. A brief account of this work is given by Mr. Collier in a paper entitled "The Arkansas coal field."

Montana.—The coal fields of Montana are probably more extensive than those of any other State, but they

are not well known except along the main lines of railroad where mines have been opened, either to supply fuel for locomotive uses or for the great copper smelters of the Butte region. The quality of the Montana coal is exceedingly varied, but as a rule only the better grades are being mined at the present time.

The most important piece of geologic work carried on in Montana during 1906 was the careful mapping of the Great Falls coal field by C. A. Fisher, assisted by W. R. Calvert, H. M. Eakin, A. J. Hazlewood, and J. D. Pollock. Geologically this field is most interesting, since the coal occurs in the Kootenai (Lower Cretaceous) formation, which is not known to carry coal in any other part of the United States, except possibly in the Black Hills region of South Dakota and Wyoming. The field was carefully mapped from Missouri River eastward along the foothills of the Little Belt Mountains as far as Stanford. A brief synopsis of the results is given in a paper by Mr. Fisher entitled "The Great Falls coal field, Montana."

The Bear Creek and Red Lodge fields of Carbon County were examined by N.H. Darton, who traced the Red Lodge group of coal beds for a considerable distance to the point where they are concealed by the overlying Tertiary rocks, and the Bridger coal bed from a point near the Wyoming line northward to Joliet. An account of this field by Mr. Darton is entitled "Coals of Carbon County, Mont."

The great lignite field of the eastern part of the State was examined by A.G. Leonard, assisted by W. R. Holgate and W. H. Clark. This party made an exploratory trip from Glendive to Miles City and thence northward by way of Jordan to Hell Creek on Missouri River. An account of this trip and of the coal beds and other strata exposed will be found in a paper by Mr. Leonard entitled "Coal fields of parts of Dawson, Rosebud, and Custer counties, Mont."

Wyoming.—Wyoming is one of the great coal-producing States of the Union. This coal is extensively developed along the Union Pacific and Oregon Short Line railroads at Hanna, Rock Springs, and Kemmerer. It is also mined to some extent at Glenrock and Big Muddy on the Chicago and Northwestern Railway and along the Burlington system at Sheridan and Cambria. In addition to these well-known localities, there are immense areas of coal land along Powder River from a point north of Casper to the Montana line, in the Bighorn Basin, in Uinta County north of Kemmerer, and in Carbon County west of Rawlins.

During the past year the Hanna field of Carbon County was rather thoroughly explored by A. C. Veatch, assisted by Max A. Pishel, Max W. Ball, and Spencer R. Logan. A brief account of this work is given by Mr. Veatch in a paper entitled "Coal fields of east-central Carbon County, Wyo."

C. E. Siebenthal made a hasty examination of the coal beds in the western part of the Laramie basin, and a brief account is given by him in a paper entitled "Coal of Laramie Basin, Wyoming."

During 1905, A. C. Veatch, assisted by A. R. Schultz, made an examination of the southern Uinta County field from the Utah State line to a point north of Kemmerer. A short account of this work appeared in Bulletin No. 285, and a full report is contained in Professional Paper No. 56, entitled "Geography and geology of a portion of southwestern Wyoming, with special reference to coal and oil." During the past year this work was carried northward by Mr. Schultz, assisted by E. Eggleston Smith. The country is exceedingly rough and mountainous, but the coal fields were mapped with considerable care as far as Snake River. This region is scarcely accessible at the present time and little is known regarding the coals, but in the event of the construction of a railroad line along Snake River it seems quite possible that much of

the area of this field would become accessible by branch lines from the main trunk system. A brief account of this field will be found in a paper by Mr. Schultz entitled "Coal fields in a portion of central Uinta County, Wyo."

In the central part of the State there is a large syncline of coal-bearing rocks which in most places is covered by Tertiary sediments to such a depth that it is not accessible, but here and there along the rim of the basin coal beds are exposed. This is the case in the vicinity of Lander, where there is a small coal field that was examined by E. G. Woodruff. A very brief account of this field is given by Mr. Woodruff in a paper entitled "The Lander coal field, Wyoming."

Colorado.—Through the explorations carried on by the Colorado Fuel and Iron Company and the development of mines in the best and most accessible fields, the coals of Colorado are perhaps better known than those of any other western State. Nevertheless, there are a number of areas about which little information can be obtained, and it has been the aim of the Geological Survey to explore these in advance of development.

The largest area of undeveloped coal lies in the northwestern part of the State, in Routt, Rio Blanco, Garfield, Pitkin, and Mesa counties. On the completion of the Denver and Northwestern (Moffitt) Railroad through Routt County the northern part of this great area, or the Yampa coal field, will be the first to be developed. This was examined in 1905 by N. M. Fenneman and Hoyt S. Gale, and a detailed report of their work appeared in Bulletin No. 297, entitled "The Yampa coal field, Routt County, Colo." A brief account was published also under the same title in Bulletin No. 285. During the last season this survey was extended southward across the anticline of Axial Basin to the Danforth Hills and thence along the Grand Hogback southeastward to Newcastle on Grand River. This work was done by

Mr. Gale, who was assisted by A. K. Adams, A. L. Beekly, and R. D. Crawford. A brief account of this work is given by Mr. Gale in a paper entitled "Coal fields of the Danforth Hills and Grand Hogback in northwestern Colorado."

Colorado-Utah.—The great Uinta Basin, which extends from the vicinity of Crested Butte, Colo., westward into Utah, continues in the latter State along the south side of the Uinta Mountains at least as far as Castle Gate. The center of the basin is deeply covered by Tertiary sediments, and at the western extremity these overlap the upturned edges of the coal-bearing rocks and conceal them so that the limit of the field in this direction is unknown.

It is generally understood that the Book Cliffs, which form the southern margin of this basin, are coal bearing, but little or no information outside of that furnished by the established mines has been available regarding the character of the coal or the number and thickness of the beds. To supply such data George B. Richardson, assisted by W. D. Neal and Leon J. Pepperberg, carried on a rapid reconnaissance during the last season from De Beque, on Grand River, Colorado, into Utah as far as the Sunnyside mine of the Utah Fuel Company, where connection was made with the work of Mr. Taff, who, during 1905, made a careful instrumental survey of the Book Cliffs field from the Sunnyside mine westward to Castle Gate, and then southward along the east front of the Wasatch Plateau as far as Mount Hilgard, in Sevier County. A report of Mr. Taff's work was published in Bulletin No. 285 under the title "The Book Cliffs coal field of Utah." A brief account of the results of the survey during last year is given by Mr. Richardson in this volume in a paper entitled "The Book Cliffs coal field between Grand River, Colorado, and Sunnyside, Utah."

Utah.—During the last year Joseph A. Taff, assisted by Carl D. Smith, examined the region about Pleasant Valley,

in the Wasatch Plateau, much more carefully than was possible during the previous year, and his report is embodied in a paper entitled "The Pleasant Valley coal district, Carbon and Emery counties, Utah."

The coal fields of Iron County in southwestern Utah, were hurriedly examined during the last year by Willis T. Lee, who visited them and procured samples for chemical analysis from the anthracite of the western extremity of the field and from the bituminous coal east of Cedar City. This is the most important field of the Southwest, as it is accessible from the San Pedro, Los Angeles and Salt Lake Railroad, and some day it may furnish fuel to most, if not all, of the desert region of the southern part of the Great Basin. A brief description of the field will be found in a paper by Mr. Lee entitled "The Iron County coal field, Utah."

New Mexico.—The largest coal field in New Mexico lies in the northeast corner of the Territory, but the coals in this field are not well known, being developed only at Durango, Colo., and Monero, N. Mex., on the northern edge, and at Gallup, on the southern edge of the basin. In Contributions to Economic Geology for 1905 F. C. Schrader[a] had a brief paper embodying the results of a rapid reconnaissance examination made by himself and M. K. Shaler along the eastern edge of the basin from Durango to Gallup. During the last year the work has been continued by Mr. Shaler, assisted by James H. Gardner. They made a careful examination of the western part of the field from Durango to the southern point of the basin, about 60 miles south of Gallup. The results of this work are contained in a paper by Mr. Shaler entitled "A reconnaissance survey of the western part of the Durango-Gallup coal field of Colorado and New Mexico."

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[a] The Durango-Gallup coal field of Colorado and New Mexico; Bull. U.S. Geol. Survey, No. 285, 1906, pp. 241-258.

In addition to the regular work noted above, the writer made a hasty examination of two small coal fields in the eastern part of the Territory—one at Capitan, in Lincoln County, and the other known generally as the Una del Gato field, in Sandoval County. A brief account of the latter is contained in a paper entitled "The Una del Gato coal field of Sandoval County, N. Mex.," and of the former in a paper entitled "Coal in the vicinity of Fort Stanton Reservation, Lincoln County, N. Mex."

California.—In general the coals of California are of so low a grade as to be unable to stand in competition with fuel oil. As a consequence many of the miners have suspended operations. From time to time during the last few years reports have been made of the occurrence of a better grade of coal in Stone Canyon, in the southeastern part of Monterey County. In 1905 Ralph Arnold visited Stone Canyon and determined the geologic relations of this coal bed. A brief account of his work appeared in Bulletin No. 285, entitled "Coal in the Mount Diablo Range, Monterey County, Cal." During the past summer the writer found opportunity to visit this mine, and a short account of the results of the examination, as well as of those obtained from a chemical analysis, is contained in a paper entitled "Coal of Stone Canyon, Monterey County, Cal."

TECHNOLOGIC WORK.

The technologic work on fuels is under the direction of Joseph A. Holmes. Up to the spring of 1907 the work of this branch has been carried on largely at St. Louis, Mo., where it was started in connection with the exposition in 1904. The principal work of the branch has been the testing of carload samples of coal, and in order to do this systematically it was necessary for an inspector to supervise the loading of cars, and as a check to take samples from the mine furnishing the carload lot. During the last year this work has been under the charge of

J. Shober Burrows, who has made an extended study of methods of sampling and the results to be obtained therefrom. A brief account of these results and a discussion of their meaning is given by Mr. Burrows in a paper entitled "The importance of uniform and systematic coal-mine sampling."

One of the most important results of the various tests for the better utilization of the fuel resources of the country is the demonstration that producer gas for power purposes can be made successfully from all grades of bituminous coal, lignite, and even peat. The results of these tests point conclusively to the substitution of producer-gas plants and gas engines for the generation of power in place of the wasteful steam engine in general use at the present time. The end of the steam engine is nearly in sight, and many people are wanting information regarding the present status of the producer and gas engine, in expectation of their installation in the near future. In order to supply unbiased information to the public on this important subject, R. L. Fernald, professor of mechanical engineering, Washington University, St. Louis, Mo., who has had charge of all tests made at the fuel-testing plant on the gas producer and gas engine, has prepared a brief statement which will be found in a paper entitled "The present status of the producer-gas power plant in the United States."

Another field of investigation which promises to have a distinct bearing on the better utilization of our coals is that of briquetting, and the present condition of the briquetting industry is summarized by Edward W. Parker in a paper entitled "Condition of the coal-briquetting industry of the United States."

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DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

BULLETIN 383

NOTES

ON

EXPLOSIVE MINE GASES AND DUSTS

WITH SPECIAL REFERENCE TO

EXPLOSIONS IN THE MONONGAH, DARR, AND NAOMI COAL MINES

BY

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WASHINGTON
GOVERNMENT PRINTING OFFICE
1909

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NOTES ON EXPLOSIVE MINE GASES AND DUSTS, WITH SPECIAL REFERENCE TO EXPLOSIONS IN THE MONONGAH, DARR, AND NAOMI COAL MINES.

By Rollin Thomas Chamberlin.

INTRODUCTION.

CHARACTER OF THE REPORT.

The studies herein reported were begun as a part of researches undertaken by the United States Geological Survey looking to the more efficient utilization of the coal in the United States through the reduction of waste in its extraction, and were continued as part of further researches having regard to the conservation of the fuel resources of this country and to the lessening of injuries and fatalities in coal mining.

Among other phases of the general problem to be studied were the origin of the gas which escapes into coal mines, its modes of occurrence in the coal and rock strata, and the conditions governing its outflow into the mines. The subject of relative danger from destructive explosions due to gas and coal dust in different mines belonging to different coal fields was to be one of the principal lines of investigation.

But this work was barely under way when the series of unusually disastrous explosions in the Naomi, Monongah, and Darr mines of Pennsylvania and West Virginia, in December, 1907, afforded an exceptional occasion to observe the behavior of explosions on a large scale. Because of the opportunities for study afforded by these terrific explosions, the inquiry originally planned was diverted to the more specific investigation of the conditions

in these mines, and the examinations have been directed toward finding those qualities of gas and dust which were concerned in these explosions. The following discussion, therefore, consists essentially of a report on that subject; but it is far from being exhaustive, and is to be regarded as a preliminary outline of investigations which are still in progress.

EXPLOSIONS STUDIED.

The first of the three mine explosions mentioned occurred in the Naomi mine of the United Coal Company, near Bellevernon, Pa., on Sunday, December 1, at 7:40 p. m. All the men who were within the mine at the time, fortunately only 34, were killed.

Less than a week later there occurred in mines Nos. 6 and 8 of the Fairmont Coal Company at Monongah, W. Va., the most disastrous mine explosion yet recorded in the annals of American mining. The mines were comparatively new and well laid out. Mine No. 8 had been in operation only about two years and was the pride of the Fairmont Coal Company. Mine No. 6 was first opened about four years earlier. In order to make it possible, in case of emergency, for either mine to be ventilated by the ventilating system of the other, the two sets of workings were connected underground. The F face heading of mine No. 6 led directly into No. 2 north heading of No. 8 mine. On Friday, December 6, at about 10.30 in the morning, an explosion of unusual violence swept completely through both mines, pursuing its course throughout the numerous ramifications and bursting out of the two pit mouths, located 1¼ miles apart, nearly simultaneously. The slope of mine No. 6 was only slightly damaged, but at the mouth of No. 8 the destruction was very great. The fan was wrecked, the engine house was demolished, and mine timbers were blown across Monongahela River. As nearly as can be determined, 361 men were killed in the two mines by the explosion.

While the inspection of the Monongah mines was still in progress, on Thursday morning, December 19, at about 11.20, a similar explosion wrecked the Darr mine of the Pittsburgh Coal Company at Jacobs Creek, Pa.; 238 men lost their lives in this explosion, which in number of casualties is second only to the Monongah disaster in the history of American mining. Of all the men in the mine at the time of the explosion, only one man, who happened to be within 100 feet of the surface on an old manway in a wet, unexploded portion of the mine, succeeded in escaping alive.

The underground investigation of these mines was made in cooperation with Clarence Hall and Walter O. Snelling, of the United States Geological Survey, and James W. Paul, now of the Survey but at that time chief of the department of mines for West Virginia, to all of whom the author is greatly indebted for valuable assistance, suggestions, and advice. Mr. Paul will report on the nature of these explosions, the precipitating causes, their destructiveness, and the general conditions in these mines following the disasters. The present report is confined essentially to the laboratory examination of some of the explosive materials collected from these mines directly after the explosions.

GASES FOUND IN THE MINES.

METHODS OF COLLECTING.

As soon as practicable after these explosions samples of the mine atmosphere were collected at the coal faces and from the return air ways in various parts of the mines. It was hoped that something as to the nature of the after damp might be determined, but as the exploration of the mines could be carried only where there had been a certain amount of ventilation, the samples of after damp were necessarily greatly diluted with air. With the aid of breathing helmets and compressed-air cylinders attempts

were made to collect after damp in the tight places where there appeared to have been little ventilation, but the subsequent analyses have shown that the proportion of after damp remaining was small. Other samples were taken to determine the accumulation of fire damp in the workings.

The samples of air and gas from these mines were collected for analysis in glass tubes of 125 cubic centimeters capacity. These tubes were drawn out to a 5-millimeter bore at each end, over which was slipped a piece of red antimony rubber tubing 5 to 6 cenitmeters in length. Before entering the mine each tube was filled with water, and a tight-fitting plug of glass rod was inserted in the rubber tubing at each end. To take a sample of the mine air the glass plugs were removed from the ends of the tube, allowing the water to run out and be replaced by air, after which the ends of the tube were securely closed by the plugs and the rubber connections tightly wired with copper wire. Glass tubes thus sealed were found to hold gas samples for several weeks without apparent change from leakage or diffusion. However, as a thin film of water always remains upon the walls of the tube when the gas is collected in this manner, it is inevitable that a small amount of carbon dioxide be absorbed. Haldane[a] has called attention to the fact that when gas samples are collected in glass tubes whose walls are moist, a small amount of carbon dioxide is absorbed by the sodium silicate of the glass. If the water used be clear, the gas sample loses a small amount of carbon dioxide, but if the water used be dirty, the sample may gain carbon dioxide from the action of bacteria. The samples of gas collected in the Naomi, Monogah, and Darr mines are all subject to these criticisms. Clear water was used in every tube but one, No. 26, which had to be refilled from a pool of standing water in the mine.

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[a] Foster, Sir Clement, and Haldane, J. S., The investigation of mine air.

Whenever the sample could not be analyzed within a few days after it was collected, the rubber connections were completely coated with paraffin, thus preventing with certainty any passage of gas through the rubber.

The samples of gas obtained from these mines were for the most part selected either from points in the workings where there appeared to be unusual quantities of fire damp, or where the presence of after damp was suspected. Other samples were collected from the return air currents to obtain information upon the general character of the air throughout certain sections of the mines. Except in one or two special cases, the samples were collected just below the roof, in order to obtain a proportion of methane somewhat near the maximum present in the air. This was thought desirable because the gas near the roof would be most likely to be ignited from an open light upon a miner's cap, and because the maximum percentage of marsh gas in an entry gives the best indication of the danger from gas.

ANALYSES.

The analyses of the samples of gas collected within these three mines are given in the table which follows. The first 18 analyses were made according to the technical method of gas analysis described by Hempel.[a] The remainder of the analyses, with the exception of Nos. 23 and 29, were carried on over mercury in the apparatus devised by Professor Bone, of the University of Leeds.[b]

Analyses of samples of gas taken in Monongah, Naomi, and Darr mines.

[Tabular Matter Omitted]

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[a] Hempel, W. M., Methods of gas analysis, 1902: technical method.

[b] *Bone*, W. A., Jour. Soc. Chem. Ind., vol. 27, 1908, pp. 10-12.

METHANE.

It will be seen from the table that the highest percentages of methane (CH_4) were usually found in the samples collected at the faces of some of the mains. Methane in such high percentages occurred only more or less locally, either at the high points in the roof where, owing to its extreme lightness, it had accumulated, or as a thin stratum of fire damp floating along beneath the roof of an entry for a short distance from the coal face. Generally the diffusion of the gas was found to have taken place slowly in tight places where the current of air was slight, so that at a few rods from the face the percentage of methane in the air, even at the roof, was much reduced, while at the floor there was still less methane.

But in some places the gas was found to have become far more evenly distributed throughout the entries. In several of the entries in the Darr mine (see analyses 21, 22, 24, and 26) fire damp was detected in such quantities by the Wolf lamp, at distances of 75 to 100 feet from the coal face, that it was not thought advisable to push on to the faces even with safety lamps. Later, with an electric flash light to illumine the way, the faces of two of these three entries were visited. Tube 28, filled with air on January 4, 1908, from the face of No. 12 right butt, off entry 27, contained 7.99 per cent of methane, while tube 26, filled on January 2 at a point 80 feet from the face of this same entry, contained 4.24 per cent of methane. The conditions were similar at the face of the main entry. Tube 21, filled with air from the roof of the main entry, 5 feet inby the third right crosscut, inby entry 30, contained 4.99 per cent of methane, while tube 22, filled a few minutes later at a point 20 feet inby the fourth right crosscut (about 60 feet from the face of the main), contained 6.01 per cent of methane. Two days later a sample of gas (No. 27) was taken from the mouth of a drill hole 5 inches in diameter in the face of the right air course of the main entry. In this methane amounted to 32 per cent.

These figures show that the percentage of methane in the air near the roof of the gassy entries diminished rapidly with increasing distance from the face. This was true even in entries where the diffusion has been fair, for the Wolf lamp at the point where tube 21 was filled indicated gas as low as 2 feet above the floor. The high percentages of methane were chiefly local. The main return air currents, and in general those parts of the entries distant from the coal face, contained methane only in very much smaller proportions. In these passageways the gases had become more thoroughly mixed by diffusion as well as diluted in the draft of air, and hence here it made less difference whether the sample for analysis was collected at the roof or near the floor. An example of this was shown in No. 1 left butt, off entry 30, in the Darr mine. Tube 20, filled at the roof of the entry 20 feet inby from entry 30, showed only 1.55 per cent of methane. At this point a Wolf lamp on a tie showed a ¼-inch gas cap, indicating from 1 to 1.5 per cent of methane. As only a very slight current of air was moving out of this entry, the thorough mixing of the gases was apparently due largely to steady diffusion rather than to the air draft. Tube 29, filled with gas-laden air from the roof of entry 28, Darr mine, about 125 feet inby No. 1 left butt, contained 2.12 per cent of marsh gas. On the floor just below nearly a ⅓-inch gas cap was got with a Wolf lamp. The air was moving slowly.

In the main return air ways the fire damp was more diluted. On December 21, two days after the explosion in the Darr mine, when the ventilation was bad, the air from the return air way just inside of the first crosscut to the left, inby from the swamp entry, contained 2.51 per cent of methane (analysis 17); but the air at this same point on January 1, when the ventilation was better, contained only 1.50 per cent of marsh gas (analysis 18). On January 2 the return air from the swamp entry showed only 0.58 per cent of methane (analysis 23). Two days later a Chesneau lamp registered 1.4 per cent of fire

damp where tube 18 had been filled, and 0.4 per cent in the return air from the swamp entry, indicating that, while there had been a slight improvement in the character of the air within these two days, the figures for tubes 23 and 18 are probably not far from the normal conditions. Where the Chesneau lamp registered 1.4 per cent of fire damp on January 4, and the chemical analysis of gas collected January 2 gave 1.50 per cent, the Wolf lamp on each occasion showed a ¼-inch gas cap.

In the Naomi mine, where very high percentages of methane were found at some of the entry faces, the main return air current on the center main, 1,800 feet from the mouth of the slope, contained, on the afternoon of December 14, 1907, only 0.75 per cent of marsh gas (analysis 16).

At Monongah there appears to be much less gas in the mines, both locally near the coal face, and in the return air in particular. In mine No. 6 the air of the main south return air way, 50 feet from the bottom of the shaft leading to the fan (analysis 9), and another sample from the main right return air way, 200 feet inby a face entry (analysis 10), contained, on December 16, 1907, only 0.22 and 0.45 per cent of methane, respectively. In mine No. 8 a test of the air collected on December 12 from the return air way opposite room 15 on the fifth right, off second north heading, showed only 0.09 per cent of methane (analysis 3). However, instead of collecting the gas from near the roof, the tube in this case was filled at a point about midway between the floor and the roof.

AFTER DAMP.

In all the samples of mine air collected in the Monongah, Naomi, and Darr mines within a few days after the explosions, the percentage of carbon dioxide greatly exceeded that of carbon monoxide. But it is true that none of these samples was collected until a fair state of ventilation had been reestablished after the explosions, such

that parties could remain in the mines for several hours. The best of the samples was No. 17, taken from the Darr mine by Clarence Hall on the afternoon of December 21, two days after the explosion. While obtaining this sample three of the party were so overcome as to be forced to leave the mine. An analysis of this air showed 1.07 per cent of carbon dioxide and 0.61 per cent of carbon monoxide. No other sample approached this one in respect to the prominence of carbon monoxide, but even in this one the after damp was much diluted with air.

It may be instructive to undertake a rough calculation to show approximately what proportion of after damp is really present. Assume that essentially all of the oxygen of the air in the exploded portion of the mine was consumed in the explosion, and that carbon monoxide was formed because of insufficient oxygen, either directly or from the reduction of carbon dioxide by the floating particles of incandescent coal dust. Before making a computation of the proportion of after damp, it is necessary to decide to which of these reactions the carbon monoxide is to be assigned, as it makes a difference in the total resulting amount of carbon monoxide whether the monoxide be formed directly from the partial combustion of the gas or through the reduction by the glowing particles of coal dust of a portion of the carbon dioxide produced in the explosion.

Beard,[a] quoting Thomas, states that the explosion of a mixture of methane and air at the most explosive point (methane 9.57 per cent, air 90.43 per cent) produces no carbon monoxide, but that as the percentage of methane is increased above the point named carbon monoxide is formed in ever-increasing proportion until, at what he gives as the explosive limit, 16.67 per cent of methane in air, the result of an explosion would be 87 per cent monoxide and 13 per cent dioxide; while near the limit of inflammability, 29 per cent methane, no carbon dioxide

[a] *Beard*, J. T., Mine gases and explosions, 1908, p. 130.

is formed. He writes the equation $2CH_4+O_2+4N_2=2CO+4H_2+4N_2$.

Agreeing with this in a measure is the statement of the French fire-damp commission that the explosion of a mixture of methane and air, containing 12 per cent of methane, gave rise to the following gases: Carbon dioxide, 4.8 per cent; carbon monoxide, 3.9 per cent; methane and other hydrocarbons, 2.5 per cent; hydrogen, 3.5 per cent; nitrogen, 82.2 per cent; total, 96.9 per cent.

At variance with this, Broockmann concludes from his own experiments with the products of combustion of methane and air that a pure fire-damp explosion gives no carbon monoxide.[a] A mixture of air and fire damp containing from 10.8 to 13.5 per cent of marsh gas he found to give two separate flames. Expecting to find some carbon monoxide formed as the result of the first flame, Broockmann removed the products of the first combustion, in an exploding mixture of methane and air, before the appearance of the second flame, but in no case found a trace of carbon monoxide. Instead, the heat of the first combustion converted the unconsumed methane into acetylene and hydrogen. These doubtless furnish the fuel for the second flame.

Heise and Herbst also state[b] that a pure gas explosion never produces carbon monoxide, and that an explosion of air containing more than 9½ per cent of methane produces, along with steam, only carbon dioxide. Differing somewhat with Broockmann, they state that the two elements, carbon and hydrogen, which are combined in CH_4 become separated only when sufficient oxygen is present for the complete oxidation of both elements. Otherwise the compound does not allow itself to be split up.[c]

[a] Broockmann, Niederrheinisch-WestfiilischenSteinkohlenbergbaues, vol. 6, p. 52.

[b] Heise and Herbst, Bergbaukunde, vol. 1, 1908, p. 448.

[c] Idem, p. 463.

For the computation in the case in hand (analysis 17) it will be assumed that the carbon monoxide has not been produced directly from a partial combustion of methane and other hydrocarbon gases, but has resulted from a reduction of the carbonic acid by the particles of incandescent coal dust, according to the reaction $CO_2+C=2CO$. The analysis of the return air showed 1.07 per cent of carbon dioxide. From this are to be deducted both the percentage of carbon dioxode in the air, 0.03 per cent, for the after damp has been much diluted since the explosion, and also the carbon dioxide exhaled from the coal during that time. A rough estimate of the latter can be made, as the analyses of the gas issuing from the coal in the form of feeders and blowers, as well as from coal bottled in a vacuum, show that the proportion of carbon dioxide to methane in the gas escaping from the fresh coal of these mines is 1 or 2 to 100. As the percentage of methane was found to be 2.51, the amount of carbon dioxide which the fresh coal has contributed to the air since the explosion may be taken to be 0.03 per cent. This is the proportion of carbon dioxide to methane in the gas from fresh coal. In the older workings of the mine the proportion of the dioxide is greater than this; but in the absence of data upon the ratio of these gases escaping from coal which has long been exposed to the air, no allowance is here made for the greater proportion of carbon dioxide in the old entries. This leaves 1.01 per cent of carbon dioxide to be assigned to the after damp produced by the explosion.

To produce 1.01 cubic centimeters of carbon dioxide and 0.61 cubic centimeter of carbon monoxide from an explosion of methane, in cooperation with coal dust whose heated particles cause the formation of the monoxide by abstracting oxygen from a portion of the dioxide, 2.63 cubic centimeters of oxygen would be consumed, providing that all the hydrogen of the methane was burned to water.

This computation does not take into account the fact that, in addition to methane, other hydrocarbons participated in the explosion. These necessarily consisted of relatively more carbon than CH_4. But, on the other hand, the coal-dust particles which caused the reduction of the dioxide to the monoxide, instead of being pure carbon, contained a certain proportion of hydrogen, a portion of which was probably oxidized to water. These two factors tend to offset each other. Because of their complexity they can not be further treated here.

On the supposition that no carbon dioxide was absorbed by the water in the mine, and that all the oxygen in the air was consumed in the explosion, the volume of the oxides of carbon in the sample collected should bear the same relation to the amount of CO_2+CO originally developed by the explosion as the corresponding volume of oxygen, 2.63, does to 20.5, the percentage of oxygen which is assumed to have been originally present in the mine. This figure is taken because the coal rapidly absorbs oxygen from the air. The average proportion of oxygen in the air of tight places in this mine was found by a calculation from the analyses to be only 20.08 (see p. 15); but 20.50 would seem a better figure for the average of the mine air as a whole. The ratio $\frac{2.63}{20.5}$ is equal to 0.128, or from 12 to 13 per cent of after damp in the sample collected.

However, this can at best be only a rough estimate, as several uncertain factors are involved. The mine air previous to the explosion contained a small and unknown quantity of carbon dioxide. But on the other hand, some carbon dioxide has doubtless been absorbed by the water in the mine since the explosion. In a measure these factors tend to offset one another. It is also true that other hydrocarbons, in addition to methane, were consumed in the explosion, and these would unite with oxygen

in different proportions. But methane in all probability contributed most.

While this sample of the air from the Darr mine after the explosion shows that carbon monoxide may reach a considerable percentage in after damp, the other samples of the mine air which, however, were collected after better ventilation had been established, showed the presence of much less carbon monoxide, even though the proportion of the dioxide in some samples amounted to 1 per cent. It seems probable that some and perhaps most of the difference was due to more thorough ventilation before the later samples were collected, for carbon monoxide, once removed, would not be resupplied except in very small quantities, but carbon dioxide might have been supplied from the coal, the lamps, etc., since the explosion.

However, the relative proportions of carbon dioxide and carbon monoxide in after damp must always be variable, depending on the ratio between the available oxygen and the available combustible matter, gas and dust, in the air. If the explosion were due largely to methane in the air, in quantities not exceeding 10 per cent, and with little dust as an accessory, little carbon monoxide would be formed. But, on the other hand, in a dust explosion where large quantities of coal dust are present, capable of distilling volatile hydrocarbons in volumes too great to be entirely consumed by the quantity of oxygen in the mine air, and where there is an abundance of hot coal dust stirred up in the air, carbon monoxide might, perhaps, be produced in greater quantities than the dioxide. A coal-dust exploion is more complex than one of fire damp. If the explosion of the dust proceeds by rapidly feeding the flame with combustible gases and hydrocarbon vapors derived from it through the influence of the heat. as is believed to be the case, there is, at first, sufficient oxygen at hand to insure the complete oxidation of the gases developed. Carbon dioxide and steam result. But under ordinary conditions, with plenty of dust, the distillation of volatile matter continues, liberating an excess

of readily available combustible gas which, because of insufficient oxygen, is only partly consumed. In the absence of oxygen, a portion of the carbon dioxide already produced is reduced to carbon monoxide in variable proportions, depending on the amount of red-hot dust floating in the atmosphere and the length of time during which the dust remains sufficiently heated to allow the reducing reaction to proceed.

DEFICIENCY OF OXYGEN.

In order to ascertain the character of the mine air, irrespective of the after damp, a recalculation of the analysis was made. The analyses of gas from mine feeders and from coal bottled in a vacuum show that the proportion of carbon dioxide to methane in the gas escaping from the fresh coal of these mines is 1 or 2 to 100. Wherever methane is found in the mines it is safe to assume that a volume of carbon dioxide corresponding to 1 per cent of the methane has escaped from the coal simultaneously with the marsh gas. This figure, plus the 0.03 per cent of carbon dioxide in normal air, is subtracted from the percentage of carbon dioxide in the analysis. To be on the right side, it is assumed that all the rest of the carbon dioxide has been produced by the oxidation of CH_4, as the combustion of this compound consumes more oxygen per unit of carbon dioxide formed than any of the other compounds which could have participated in the explosion. The amount of oxygen which would have been required, on the basis of an explosion of methane, to yield the oxides of carbon found in the analysis, is then added to the percentage of oxygen shown by the analysis. The percentage of methane in the analysis, plus the carbon dioxide of normal air and that which, on the basis of the methane present, has been considered to have been derived from the coal since the explosion, is deducted from the total, and the remaining figures recalculated so as to add to 100.

This gives an estimate of the percentage of oxygen in the mine air irrespective of the after damp from the explosion and the feeder gas which has escaped into the workings from the coal since the explosion. Because of the assumptions, these estimates give a generous figure for the percentage of oxygen. An average of the three analyses of air from the Naomi mine made in this way was 20.86 per cent, eleven analyses from the Monongah mine gave 20.72 per cent oxygen, and thirteen analyses from the Darr mine gave an average of only 20.08 per cent oxygen. These figures indicate a deficiency of oxygen in the mine air which can not be attributed to the formation of free carbon dioxide or carbon monoxide, unless it be supposed that much of the carbon dioxide formed has been absorbed by water in the mine, which seems improbable in these dry mines. Instead, it would appear that the coal has absorbed oxygen from the air, thus reducing the percentage of that gas and increasing that of nitrogen.

The greatest deficiency in oxygen occurred in the sample of gas-laden air collected near the face of the swamp entry in the Darr mine (analysis 25). Corrected for carbon dioxide and methane, this sample showed the unusual proportions, oxygen 16.13 per cent and nitrogen 83.87 per cent. This sample was also characterized by the highest proportion of methane (50.67 per cent) obtained in these mines. That the diffusion of the air and gases in this cleft in the roof had progressed slowly is shown by the accumulation of so much fire damp, and it was apparently because of the stagnancy of the air in this nook that the coal was able to abstract such a proportion of the oxygen. It must be noted that feeder gas often contains several per cent of nitrogen, so that with 50 per cent of methane (feeder gas) present in the air a part of the apparent excess of nitrogen and deficiency of oxygen may, perhaps, be explained by this nitrogen coming from the coal.

As many of the samples of air which have contributed to these averages, particularly those from the Darr mine, were collected from sheltered, poorly ventilated nooks in order to get data on the accumulation of fire damp, the low figure of 20.08 per cent for oxygen is not representative for the air of the mine as a whole. While the loss of oxygen is less conspicuous in the general mine air than in pockets in the roof and in tight places where there is little air stirring, its effect is felt throughout the mine, and furnishes an additional reason for ventilation which will afford a continuous supply of good air, as well as remove the dangerous fire damp and the noxious products of combustion.

POSSIBLE CONDITIONS OF GAS IN COAL.

The gas which escapes from coal may exist within the mass of the coal in three possible conditions. It may be mechanically held or imprisoned in minute pores, cavities, or cracks throughout the coal; it may be occluded or dissolved within the substance of the coal; or it may be the result of slowly operating chemical reactions, such as those which have produced the coal from the original vegetable matter and which, still operative, might, as a working hypothesis, be supposed to generate gas in proportion as it is given off. In the first two cases the gases are supposed to be already existent within the coal as gases; under the third hypothesis they are to be regarded as now produced for the first time by chemical decomposition of the solid coal substance. The ultimate source of the gases may be taken as the same under each hypothesis, for there can be little doubt that the bulk of the gas given off from coal has arisen from the slow decomposition of organic matter as a by-product in the process which has converted vegetable humus into coal. The first hypothesis favors the belief that the gas-generating process has been very slow and that such gas as comes off at the present time has long been stored in minute cavities or pores, from which it escapes when the

coal is fractured, as in mining operations. The second hypothesis assumes, like the first, that the gas was developed long ago, but differs from it in assuming that the gas, as fast as it was developed from the coaly matter, was retained within the coal substance in solution, or occluded, instead of being held mechanically in minute crevices and cracks. This hypothesis is suggested by the well-known property of various metals to occlude or dissolve within their mass certain gases, and by the familiar power of charcoal to condense on its surface or absorb many times its own volume of various gases. The term occlusion, which Graham gave to this imperfectly understood property of certain metals to absorb particular gases, has been very loosely used, especially in mining literature, where "occluded gas" usually means gas held according to either of the first two hypotheses, the radical differences between them having generally been overlooked. By some writers, indeed, the term is intended to carry the idea of the first hypothesis alone, the second, that of true occlusion, being left out of account.

The third idea is only a working hypothesis which is framed to recognize the possibility that the coal-forming, gas-generating process is still in progress, and that the escape of the gases is a sort of index of the present chemical activity within the coal.

LIBERATION OF GAS BY CRUSHING COAL.

PLAN OF EXPERIMENTS.

To throw light on this possible threefold state in which the gases are held in coal, and to determine the relative importance of the three hypotheses, a series of experiments was devised. In the first the coal was broken up and crushed to a coarse powder in an air-tight receptacle, from which any gas liberated during the process of crushing can be extracted by a vacuum pump. Only such gas as was already stored in the coal can be freed by crushing it, as the process is accomplished very quickly. How much gas might be expected to be freed from a state of

true occlusion by crushing is less clear. The most thoroughly studied form of occlusion is that of hydrogen by palladium. Whether palladium charged with hydrogen will give off part of its gas at the ordinary temperature when placed in a vacuum depends entirely on the condition of the metal. If the palladium is in a very finely divided state, a considerable portion of the hydrogen is given off when the pressure is greatly reduced;[a] but the cast or forged metal gives off no hydrogen whatever when placed in a vacuum at ordinary temperatures.[b] The hydrogen begins to be evolved from the solid metal only at temperatures above 100° C. It is conceivable that reducing the size of coal fragments by crushing in a vacuum might, in some similar way, allow the evolution of gas which was not possible from the lump coal. But as the lumps of coal are only crushed down to a coarse powder it would not seem as if truly occluded gas should be freed, to any large extent, by the coal crusher, even in a vacuum. If crushed under full atmospheric pressure in an inert gas, no occluded gas should be liberated. It is not at all certain that coal behaves like palladium in these matters. It seems, therefore, safer to conclude that by crushing the coal and opening up many pores and cavities it is chiefly the imprisoned cavity gas that is liberated.

METHOD OF CRUSHING.

The apparatus for crushing the coal was constructed on the principle of the familiar steel mortar, fitted with a long piston rod incased in a heavy rubber tubing, which, with one end fastened to a flange at the top of the mortar cylinder and the other wired to the piston rod near its free end, makes an air-tight connection, and at the same time renders the piston movable. A few vigorous blows delivered with a heavy mallet upon the end of the piston rod serve to crush the coal, after which the

[a] Moissan, Chimie minérale, vol. 5, p. 860.

[b] Graham, Chemical and physical researches, pp. 283-290.

gas liberated during the crushing is pumped out of the cylinder through a short delivery tube, fitted with a stop-cock.[a] The apparatus is intended to maintain a complete vacuum for the short time required to crush a sample of coal, but in practice it was found advisable, in order to prevent a slight inleaking of air, to place the cylinder of the crusher in a pail of water during the operation. This crusher was able to pulverize from 50 to 100 grams of coal at a time. The coal was crushed both in a vacuum and under full barometric pressure.

DETAILED RESULTS.

Sample 1.—Coal collected on December 13, 1907, from the face of No. 4 right entry, off the F-face heading, mine No. 6, Monongah, was crushed in a vacuum on January 27, 1908. Starting with lumps of coal of about 1 cubic inch, the material was crushed twice, the crusher being opened after the first crushing and the finer dust sifted out. The extent to which the coal was reduced after both crushings was determined by sieves, as follows: Of 100.21 grams of coal used, 20.56 grams passed through a 30-mesh sieve, 31.26 grams passed through a 10-mesh sieve, and 48.39 grams was too coarse to pass the 10-mesh sieve. There was obtained 10.57 cubic centimeters of gas at 0° C. and 760 millimeters pressure, having the following composition:

Analysis of gas obtained by crushing coal sample 1

	Per cent
Carbon dioxide	2.90
Methane	39.65
Oyxgen	10.07
Nitrogen	38.11
Nitrogen (excess)	9.27
	100.00

[a] This rock crusher has been described in detail, with a diagrammatic sketch in The gases in rocks: Carnegie Institution of Washington, Pub. No. 106, p. 39.

If the gas all came from the coal which passed through the 30-mesh sieve, the methane would amount to 0.26 of the volume of that coal. The latter figure is to be preferred.

Sample 2.—Coal collected December 12, 1907, from room 3 on third right, off second north heading, mine No. 8, Monongah, was crushed in a vacuum January 28, 1908. Two lumps of coal were pulverized, in two crushings, to the following degree of fineness: Of 49.13 grams in all 20.24 grams passed through the 30-mesh sieve, 23.67 passed through the 10-mesh sieve, and 5.22 grams was too coarse to pass the 10-mesh sieve. The crushing liberated 11.71 cubic centimeters of gas at 0° C. and 760 millimeters pressure, which had the following composition:

Analysis of gas obtained by crushing coal sample 2

	Per cent
Carbon dioxide	1.56
Methane	40.99
Oyxgen	9.86
Nitrogen	37.62
Nitrogen (excess)	10.27
	100.00

The quantity of methane is equivalent to 0.30 of the coal which passed the 30-mesh sieve, to 0.14 of the volume of the 10-mesh coal, and to 0.12 of the volume of all the coal used.

A duplicate test with this same sample of coal, crushed in three trials, afforded the observation that there is not any very noticeable slackening in the gas obtained from the second and third crushings. For the first trial the total weight of coal is used. After the gas has been pumped over into the receiver, the crusher is opened and the fractured coal sifted with both the 10-mesh and 30-mesh sieves. Only the coal coarser than the 10-mesh sieve is returned to the cylinder of the crusher for the second trial. The second trial thus crushes coal fragments

averaging about the size of a bean to fine 10-mesh coal and dust, and as it crushes about the same weight fine enough to pass through the sieves as did the first trial, it is to be expected that about the same volume of methane will be obtained. After the second trial the coal is again sifted and that portion which is too coarse to pass through the 10-mesh sieve is put back into the crusher for the third trial. It is clear that some of the gas comes from that coal which is partly crushed, though not fine enough to go through the 10-mesh sieve, but in estimating the volume of gas given off per unit volume of coal it seems advisable to consider only that coal which has passed through the sieves, for whatever gas may have come from the coarser coal would undoubtedly be offset by the gas still remaining in the fine coal. Crushing coal to 30-mesh does not remove all the gas.

In the experiments with samples 1 and 2 the coal was crushed in a vacuum and the gas brought out under reduced pressure. To ascertain the part played by low pressure in this process of gas extraction, and hence whether much gas escaped from occluding bonds, samples of coal were crushed under the full barometric pressure, both in air and in an atmosphere of carbon dioxide.

Sample 3.—Coal from the same can as sample 1 (p. 18) was crushed in air under full barometric pressure. As it was necessary in this experiment to discover how much methane is liberated solely by crushing the coal, without the cooperation of a reduction in pressure, the gas was removed from the crusher in two portions. The first portion consisted of the air and gas which was removed by the first stroke of the vacuum pump. The stopcock being open only about two seconds, and only about half the contents of the crusher being removed, whatever methane was found in this portion must have been freed from the coal without the influence of reduced pressure. As soon as this portion could be stored away for analysis,

the remaining gas was rapidly pumped out of the crusher. These two portions were analyzed as follows:

Gases removed after crushing coal sample 3 in air, with their relation to the coal by volume.

[Tabular Matter Omitted]

As would naturally be expected, the percentage of methane is higher in the second portion than in the first, though the difference is not great. But the greater amount of methane in the second portion was not liberated entirely through the influence of reduced pressure, as the fine coal had stood longer in the second case than in the first, and the element of time proves to be an important factor in the escape of gas from coal.

However, only the first portion is to be taken as representing the gas liberated during the crushing under full atmospheric pressure. An estimate of the total volume of gas obtained from the crusher on the basis of the analysis of the first portion gave the first two columns of the following table. A comparison of these figures with those in the last two columns, obtained by combining the volumes of the two portions analyzed separately, may help to show how much gas may be attributed to the reduced pressure.

Relations to the coal by volume of gases removed after crushing coal sample 3 in air.

[Tabular Matter Omitted]

The confirmatory tests were made with other samples of coal from Monongah mine No. 6. Sample 4 was collected December 16, 1907, from the face of the east returning air way, and crushed March 10, 1908. Sample 5 was collected December 13, 1907, from the face of the II manway, and crushed March 18, 1908. Each of these

samples was crushed in air under barometric pressure, and the gas removed in two portions. For each sample the total volume of methane was calculated for both portions of gas, on the basis of the analysis of the first portion, which came over with the first stroke of the pump. At least this calculated amount of methane must have come off without the aid of reduced pressure. Expressed in terms of the volume of coal which was crushed down to 30-mesh, the amount for sample 4 was 0.27, and for sample 5, 0.79. The volume of methane actually obtained for the two portions was, in the same terms, 0.41 for sample 4 and 0.86 for sample 5.

In the test of sample 5 the difference between the total volume of methane actually obtained and the calculated volume which must certainly have been liberated from the coal under full barometric pressure is small. Moreover, only a portion of this small difference can be attributed to the effect of reduced pressure, as other factors, such as slow diffusion and the greater interval of time, have helped to cause this difference.

For a series of systematic experiments to show the amount of methane which is liberated from the same coal under various conditions, the can of coal which was collected from the face of the H manway in Monongah mine No. 6 was selected (sample 5). The results of crushing lumps of this coal are as follows, the several tests being set forth in numbered paragraphs, with the volume of coal crushed to 30-mesh and to 10-mesh:

1. Coal was crushed in a vacuum, but so much water vapor was given off and drawn past the calcium chloride drying tube into the pump that in order to draw over all the gas it was necessary to keep the pump going for nearly one hour. Hence the time factor enters here. Ratio, by volume, of methane to 30-mesh coal, 0.88; to 10-mesh coal, 0.33.

2. Coal crushed in a vacuum and the gas immediately pumped off. Then a full atmosphere of carbon dioxide was run in and pumped out, bringing with it the last traces of methane. Two separate trials were made, giving ratios of 0.89 and 0.83, respectively, to 30-mesh coal, and 0.38 and 0.34 to 10-mesh coal.

3. Coal was crushed in a vacuum, but phosphorus pentoxide was used as a drying agent instead of calcium chloride. Ratio of methane to 30-mesh coal, 0.84; to 10-mesh, 0.33. After pumping out this gas and removing it for analysis, an atmosphere of carbon dioxide was run in as rapidly as the apparatus could be manipulated, and then pumped out again quickly, and the gas collected over a 30 per cent solution of potassium hydroxide. More methane came over, some, and perhaps most, of which is to be explained by the time consumed in the carbon dioxide treatment. The amount was 0.14 of the volume of 30-mesh coal, and 0.05 of the 10-mesh coal.

4. Coal crushed in air under barometric pressure. This test has been described on page 21 (sample 5). The amount of methane was 0.86 of the 30-mesh coal and 0.41 of the 10-mesh.

5. Coal crushed under barometric pressure in an atmosphere of pure carbon dioxide. Amount of methane, 0.91 of the 30-mesh coal, 0.44 of the 10-mesh.

Tests 6 and 7 were made to determine the influence of the length of time during which the coal is allowed to stand after crushing, upon the quantity of gas given off.

6. Coal crushed in a vacuum and allowed to stand 3½ hours with occasional pumping. Then the

apparatus was filled with carbon dioxide and pumped out again. Total duration of the experiment, 4 hours; considerably more gas was thus obtained than when the process was completed in less than 1 hour. Analyzed in four separate portions. The total methane was 1.38 times the volume of 30-mesh coal, and 0.57 of the 10-mesh.

7. Coal crushed in a vacuum. Pumping kept up for 1 hour; then, after a short time, 30 cubic centimeters of hydrogen were let in and soon pumped out. After 1½ hours an atmosphere of carbon dioxide was run in and pumped out again. Duration of experiment, 4 hours. Analyzed in three portions. Total methane, 1.39 times the volume of 30-mesh coal, and 0.53 of the 10-mesh.

These last two experiments, in which the totals include all the methane which escaped from the coal during four hours after the process of crushing, show that the gas does not all escape from the coal within the first few minutes after the coal is shattered, and that to obtain comparative results it is necessary that the time consumed during the process of removing the gas after the coal has been crushed be approximately the same in all tests. In the last test the gases pumped off during the first hour, those brought over by the hydrogen, and those which came with the carbon dioxide, were collected and analyzed separately, but nothing of significance was developed except, perhaps, the fact that the hydrogen treatment yielded somewhat less methane than had been anticipated.

These experiments, taken as a whole, appear to indicate that, in respect to the volume of methane obtained from the coal, it makes little difference whether the coal is crushed in a complete vacuum, or under the full barometric pressure, in an atmosphere either of air or of carbon dioxide, provided the gas in each case is quickly pumped out of the crushing apparatus. Gas continues to

escape from the crushed coal at a rather rapid rate for some time after it has been crushed, but this feature will be considered elsewhere.

The quantity of gas immediately liberated from the coal when it is broken up is thus largely independent of the outside pressure. Such gas, therefore, can not be supposed to have come directly from a state of occlusion, for, without an appreciable change either of temperature or pressure, occluded gas should not be given off in this way, even from finely divided coal. Nor can it come immediately from chemical decomposition of the nongaseous constituents of the coal. It must, instead, have been already stored within the mass of the coal as free gas, mechanically imprisoned in numerous pores, cavities, and crevices, from which much of it is immediately released as soon as the confining walls are shattered in the process of crushing, and the pores and cavities opened to the surface. Necessarily, in the process of crushing to this state of fineness, only a portion of the gas-holding pores are so opened as to enable the inclosed gas to escape at once. In many others, the shattering makes it possible for the gas to escape by slow diffusion, where before it was securely held. Hence an abnormally rapid escape of gas follows for a short period of time after the coal has been crushed.

However, it is not impossible that in those tests in which the coal was crushed in a vacuum or practical vacuum, the reduced pressure, acting on the fresh surfaces of the crushed coal, might have caused the escape of some truly occluded gas. If such gas escapes from the coal, it would be likely to come largely from that portion which was most finely pulverized. (See p. 17.) But quantitatively this occluded gas can not play a very important part in the gas liberated by crushing the coal, as its liberation is dependent on a reduction of pressure, and these experiments indicate that, in the volume of gas given off, it makes little difference whether the coal is crushed under

the full barometric pressure or in a complete vacuum. Thus, while there is a possibility, and even a probability, that some of the gas does come from a state of occlusion, it seems more plausible to regard the main bulk of the gas escaping from coal during the process of crushing, and an abnormal rate just after being crushed, as being cavity gas, whose escape is facilitated by the shattering which the crushed coal fragments have received. The fact that the presence of oxygen, nitrogen, hydrogen, or carbon dioxide in the crusher has little influence on the amount of methane given off during the crushing, and for a short length of time afterwards, is in harmony with the theory that this gas escapes largely from mechanical bonds.

GASES FROM COAL BOTTLED IN A VACUUM.

VACUUM BOTTLES.

The experiments with the coal crusher have shown how much gas can be liberated from these coals by crushing them to a certain degree of fineness and opening up many of the gas-holding pores. But this process does not remove all the gas, nor is it the only way to extract the gas from coal without the use of heat. To get the gas which slowly escapes from coal, different samples of coal were stored in vacuum bottles, from which the gas evolved was pumped out from time to time. Each of these bottles had a capacity of 500 cubic centimeters and was fitted with a one-holed rubber stopper containing a short delivery tube. Over the free end of the delivery tube was slipped a short piece of heavy antimony rubber pressure tubing, which serve to make the connection with the mercury pump. A strong screw clamp on the rubber tubing closed the way to the bottle. The stopper and rubber connections were all coated with paraffin to prevent leakage of air. When the air from the bottle had been completely exhausted, the clamp upon the rubber tube was tightly screwed, the rubber tube disconnected from the pump,

and a plug of glass rodding quickly run into the rubber tube as far as the screw clamp would permit. Rendered tight by paraffin the bottle was submerged in a jar of water until the time came to remove the gas. At any time desired the bottle could be connected with the mercury pump and the gas which had accumulated removed for analysis, after which the bottle was again submerged in the water jar.

VOLUME OF GAS.

The volume of the gas extracted from coal by allowing it to remain in an essential vacuum for a period of time was somewhat variable and depended on the sample of coal, the interval of time between its removal from the coal fragments, and the duration of the experiment. The finer the coal the more rapidly and completely was the gas liberated in a given period of time. At the end of six months gas was still accumulating steadily in those bottles which contained lump coal, and it was only in those containing crushed coal that the escape of gas had nearly ceased. The volume of gas from the crushed coal ranged from 0.9 to 2.3 times that of the coal from which it came. The lump coal yielded gas to the extent of 0.5 to 0.9 of its own volume during half a year at low pressure. Because of the pressure of other laboratory experiments, and the time required for the inspection of the Darr mine shortly after the material was collected at Monongah, more than a month elapsed between the collection of the coal samples and the bottling of them in a vacuum. These figures, therefore, do not represent all the methane given up by the coal since its removal from the seam, for a certain quantity of the gas may be supposed to have escaped while the coal was in the collecting cans.

To obtain data on the volume of gas lost during the first month after the removal of the coal from the seam, samples of fresh coal were collected in the usual cans, which were at once hermetically sealed with a thick coat-

ing of paraffin, before leaving the coal face. When opened in the laboratory about a week later, a determination of the gas in the cans was made, after which some of the coal was immediately placed in the vacuum bottles. In this way all the gas escaping from the coal after the sample was mined at the working face was determined. A specimen of bituminous coal in the form of lumps from the Mansfield mine at Carnegie, Pa., gave off 0.55 of its volume of gas, exclusive of nitrogen, during seven days in the collecting can and thirty days in the vacuum bottle. Analyses made at intervals during this length of time indicated that gas was freed much more rapidly during the first few days after collecting than later. But a similar experiment with gassy anthracite coal showed only a slight slackening in the rate of methane escape, and this change in the rate was almost uniformly distributed throughout the period of observation.

CHARACTER OF GAS.

The coal thus bottled in a vacuum was kept under observation for a period of half a year, during which time the bottles were connected with the mercury pump at stated intervals and the gas which had accumulated was removed for analysis. Thus not only was the rate at which the gas escaped from the coal discovered, but the character of the gas evolved throughout this length of time was determined. However, as the principal object of the experiments in which these vacuum bottles were employed was to determine the volume of methane escaping from the coal during a given interval of time, less care was given to the determination of the minor constituents, especially carbon monoxide and the ethylene series. In some tests the absorption of the olefins with fuming sulphuric acid, or bromine water, was omitted, and the gases of this series were removed, together with carbon monoxide, by cuprous chloride. Also, the leakage of small quantities of air into the vacuum bottles was not prejudicial to the chief purpose of the experiments, for

the volume of methane was in no way affected. Although these analyses are subject to these limitations, they yet serve to indicate pretty closely the general character of the gas which escaped from the coal during the period of half a year under reduced pressure. Four of these sets of analyses of the gas from coals are given in the table following.

Analyses of gases escaping from small lump coal bottled in a vacuum, with relation to the coal by volume

[Tabular Matter Omitted]

The analyses of the gas from the other samples of Carboniferous coal which were subjected to this same treatment show similar results.[a] The most noteworthy change in the nature of the gas escaping from the coal during the period of observation was the steady decrease in the proportion of nitrogen and the corresponding increase in the percentage of methane. Much of the nitrogen that appeared in the portion of gas removed from the bottles at the end of the first three weeks doubtless came from air which adhered to the coal or was absorbed by its mass, and was not given off immediately when the vacuum was produced. As the oxygen which coal absorbs enters rapidly into chemical union with the substance of the coal, the latter respires chiefly nitrogen (with some carbon dioxide) in place of the air taken in. The influence of the nitrogen from the air is naturally most felt during the early part of the sojourn of the coal in the vacuum bottles, as this nitrogen is largely held by the surface layers or in the more prominent crevices and lines of fracture. It therefore escapes from the coal more readily than the gas originating in the coal, which is distributed throughout its mass, but most abundantly in

[a] The Cretaceous coal from New Mexico, however, behaved differently (giving 30 to 40 per cent carbon dioxide and only 4 per cent methane), but that is outside the field of this report.

the interior of the fragments, from which escape is slow and difficult. As this extraneous nitrogen was removed, the percentage of the methane rose proportionately.

Methane was quantitatively by far the most important gas which escaped from the bottled coal. After the extraneous nitrogen had been removed, it ran in some tests as high as 98 per cent of all the gas coming from the coal. More commonly, however, it constituted from 80 to 95 per cent of the gas liberated. Methane reached its highest percentage in the gas from anthracite coal, which yielded only small proportions of the other constituents, carbon dioxide and nitrogen.

In addition to methane, at least one other higher member of the paraffin series was found. In nearly every analysis the explosion of the residual gas with oxygen, after the removal of the absorbable gases, produced carbon dioxide in slight excess over what would have resulted from the combustion of methane alone. Calculations show that the excess of carbon dioxide noted can be explained by the presence of ethane in proportions of a trace to 4 parts of C_2H_6 to 100 parts of CH_4. Other higher paraffins may be present in small quantities, but the computations are made on the basis of ethane alone, as $C_3H_8+CH_4 = 2C_2H_6$. So far as the tests have been carried, the bituminous coal has yielded more ethane than the anthracite (one sample only). In fact, in several tests the explosion of anthracite gas, instead of indicating higher paraffins, suggested the presence of a small amount of hydrogen.

Carbon dioxide was found to be a more variable constituent of the gas, depending on the nature of the coal from which it came. The various experiments with the Monongah coal show that in most of the samples it amounted to 1 to 3 per cent of the gas which accumulated in the bottles. In the bituminous coal from the Mansfield mine at Carnegie, Pa., carbonic anhydride became much more important, reaching 13 per cent of the

total gas given off. But on the other hand, careful analyses made over mercury failed to detect any carbon dioxide in two out of the four portions of gas from the anthracite coal of Nanticoke, while the analyses of the other two portions revealed the presence of only small quantities of this gas. Although the proportion of methane steadily increased as the experiment progressed, in general the proportion of carbon dioxide fluctuated during the period of observation.

The volume of nitrogen in the bottles fell rapidly during the progress of these experiments. Apparently much of the nitrogen which was obtained from coal by this and other methods, especially that portion of the gas which came off most readily, is not to be regarded as gas held by the coal while in the undisturbed strata, but as nitrogen absorbed by the coal after it became exposed to the air in the mining operations. Some of it was derived from air adhering to the coal and tubes in spite of the effort of the mercury pump to remove it. The leakage of air into the bottles could take place only while they were out of the water jar and connected with the pump. Hence, most of whatever inleaking air there may have been was quickly pumped over into the gas receiver with the rest of the gas, and was determined in the analysis on the basis of the amount of oxygen found. Only such air as could leak into the bottle, between the closing of the screw clamp and the immersion of the bottle in the water jar after sealing the rubber-tube connection with glass plug and paraffin coating, could remain in the bottle with the coal during the interval between tests. Absorption of oxygen from such air by the coal would leave an excess of nitrogen in the gas. But as less than one minute elapsed between the closing of the screw clamp and the immersion of the bottle, the amount of leakage was reduced to a small figure. The excess of nitrogen in the analyses of the portions of gas taken at the end of the half-year period indicated that the coal did contain nitrogen as a truly original gas. This may have come originally in part from air buried with the accumulated

vegetable matter and in part from the decomposition of nitrogenous compounds in the organic matter whose metamorphism produced the coal.

The minor constituents of the gas from coal were carbon monoxide and one or more members of the olefin series, most probably ethylene.

The above figures represent the character of the gas escaping from lumps of coal averaging somewhat less than a cubic inch in size. The evolution of gas had in no case ceased at the end of the six-months period. Instead, gas was still steadily accumulating in the bottles, though at a diminishing rate. The composition of the last portion of the gas which would eventually escape, if the experiment were carried on for a much longer period, can only be inferred from these experiments with the lump coal. However, from the studies on the finely crushed coal, from which the gas escaped much more rapidly and completely in a given length of time than from the coarser fragments used in the above tests, more can be learned on this question. Two representative experiments with coal crushed in the rock crusher so as to pass through a 10-mesh sieve, and then bottled in a vacuum, may be selected to illustrate the composition of the gas which came from the coal after the main bulk of the free gas had been liberated and the outflow had nearly ceased.

Analysis of gases escaping from crushed coal bottled in a vacuum, with relation to the coal by volume.[a]

[Tabular Matter Omitted]

According to the foregoing table the relative proportion of both carbon dioxide and carbon monoxide in-

[a] Coal from the face of H manway in Monongah mine No. 6, crushed so as to pass through a 10-mesh sieve, and then quickly placed in the vacuum bottle. The rate of methane liberation is shown by curve 7 of fig. 1.

creased greatly during the last weeks of each experiment, chiefly in consequence of the rapid slackening in the output of methane. This gas, because it diffuses and transpires at more rapid rates than the other gases mentioned, escaped from the coal sooner than the less active molecules, and hence the stored-up supply of free methane in the coal was more quickly depleted than that of carbon dioxide. Thus, on theoretical grounds, the coal may be expected to give off carbon dioxide for a longer period than methane. But these tables not only indicate an increase in the relative proportion of carbon dioxide and carbon monoxide during the latter part of the experiment, but they appear to show also an absolute increase in the volume of the oxides of carbon evolved per unit of time. During the first few weeks after the coal was bottled in a vacuum there was a reduction in the rate of outflow of all the gases, but during the last ten weeks of the last-year period the evolution of the oxides of carbon apparently proceeded at an accelerated rate. This feature was most conspicuous in experiments E and F, but the same phenomenon was also shown, though in a less striking manner, in the results of the two other similar series of analyses which furnished the data for curves 4 and 8 of figure 1.

The experiments with the rock crusher indicate that a large part of the free gas held by coal is mechanically imprisoned, under pressure, within the pores, interstices, and lines of fracture of the coal. Such gas is released immediately when the coal is pulverized and many of the gas-holding cavities are broken open. Many of the pores charged with gas are not opened by the crushing process, so that much cavity gas still remains in the crushed coal. Of the gas exhaled when the coal is placed in a vacuum, it seems safe to assign the bulk of the methane, carbon dioxide, and other gases which escape from the coal, rapidly at first, but at a progressively declining rate, to this mode of occurrence. The gases under pressure in the interstices of the coal are supposed to reach the surface by diffusion, or more strictly, transpiration, and to

escape until in time the gas thus mechanically held has bled itself out. The curves showing the rate of escape of methane support this view in regard to that gas. But the behavior of carbon dioxide and carbon monoxide in this respect appears to be different. The declining volumes of these gases during the first few weeks are natural enough, as the cavity gas comes off in greatest volume immediately after the coal is crushed. But reasons for the apparently increasingly volumes toward the end of the experiments are less easily found. Possibly the increment of carbon dioxide and carbon monoxide may come from a state of occlusion. Charcoal, which is like coal, is known to absorb the oxides of carbon in much greater volume than hydrogen [a] and probably also in greater volume than methane, though the figures for the latter are not at hand. The presumption, therefore, is that of the coal gases the oxides of carbon are likely to be held in greatest volume as occluded gas. But why such gas, even if occluded, should be liberated most rapidly after so long an interval is not apparent at the present time. Perhaps the explanation is to be found in chemical changes. For the present, however, the cause of this phenomenon must be left open. Further experimentation, to determine how generally the rule is true of different coals, is necessary before more is made of this point.

COMPARISON WITH MINE GASES

To make a comparison between the composition of the gas which escapes from the bottled coal in the laboratory, and that which issues from the rock strata, a few analyses of feeder gas from the mines may be introduced:

Analyses of feeder gas.

[Tabular Matter Omitted]

The presence of a higher member of the methane series, probably ethane, was noted in Nos. 1, 3, and 4, but the

[a] Moissan, Chimie minérale, vol. 2, pp. 251-253.

paraffins have here been computed as so much methane. In No. 5, after the removal of the hydrogen by palladium, the explosion indicated only methane.

A comparison of the foregoing table with that on page 26, after the proper allowance is made for air and nitrogen absorbed from the air by the coal used in the laboratory experiments, fails to show any significant difference between the feeder gas encountered in the mines and the gas extracted from lumps of coal in the laboratory by means of a vacuum. But a comparison with the table on page 29 shows that, while the feeder gas bears a close resemblance to the gas which is obtained from the finely crushed coal during the first few weeks under reduced pressure, it is quite different from the gas which is finally exhaled from the fine coal after it has stood some months and has lost the bulk of its free gas. The feeder gas does not contain the high percentages of carbon dioxide and carbon monoxide which characterize the last gas to escape from the fine coal. Feeder gas therefore represents that portion of the gas which is first to escape from the coal and which comes out most readily. It would seem to be that portion of the gas which, having been mechanically held at the outset in the interstitial spaces throughout the mass of the coal stratum, has subsequently escaped from the scattered pores in the coal and has accumulated along more or less connected lines of fracture, or other places of weakness or increased porosity. Traveling along these, it now issues into the mine workings from distinct orifices, cracks, or localized portions of the coal bed, at a more rapid rate and in greater volume than it is elsewhere exhaled from the solid coal.

Necessarily the issuance of gas in the form of feeders, under pressure, must die out long before the steady exhalation from the body of the coal, though the same lines of fracture continue to serve as paths of discharge for the gases slowly but steadily gathering in the porous reservoirs back in the coal. And to judge from the slowness with which even small lumps of coal manifest a change in the character of the gas transpiring from them, even

when favored by a reduction of pressure, it would seem that a very much longer period of time would be required to produce the change in composition which the behavior of the finely crushed coal suggests will ultimately occur in the gas freed from the solid coal.

But in the case of pillars and other coal surfaces long exposed to the the weathering action of the mine air, there enters another factor which is absent in the vacuum-bottle experiments—that is, the steady oxidation of the coal by the oxygen of the air. Experiments on coal bottled in air, under ordinary barometric pressure, show that oxygen is rapidly absorbed by the coal until, after a few days, there remains often only 1 or 2 per cent of oxygen in the free gas in the bottle. At the same time a certain proportion of the oxygen uniting with the coal comes off again as carbon dioxide, but this, at least during the short time of the experiment, amounts to only a small part of the oxygen entering the coal. Perhaps with an abundance of air and a much longer period of time, so as to allow the coal to absorb oxygen to its full capacity, a much larger proportion of it might eventually reappear from the saturated hydrocarbon compounds, as carbon dioxide.

The feeder gas originates back in the coal seam, away from the influence of the air, and hence it does not contain carbon dioxide from the direct oxidation of the coal. But the exposed coal surface must produce carbon dioxide in this way and thus supply the mine air with carbonic acid, which, though coming from the coal, is largely independent of the free gas content of the coal. This property appears to vary in different coals. The gassiness of a certain coal is not necessarily an index to the volume of carbon dioxide which may be developed from it as a contribution to the mine air. A few analyses made in Germany of the air from unexploded mines indicate a higher proportion of carbon dioxide, in comparison with methane, than is found in the feeder gas, suggesting that the oxidation of the coal may be a more prolific source of

the carbon dioxide encountered in the mines than the outflow of the free gas stored within the coal.

RATE OF ESCAPE

The samples of coal were kept in the vacuum bottles for twenty-six weeks, or just half a year. At stated intervals during this time the gas which had accumulated was pumped out and analyzed. As methane was by far most abundant gas thus obtained, as well as the most important from the standpoint of this investigation, the volumes of that gas given off per unit volume of coal were taken as the standard. Curves were plotted, as in figure 1, to show the rate of escape of this gas from the coal, the ordinates of the graph representing the relative volumes of methane, and the abscissas expressing the progress of time in weeks.

Descriptions of the samples of coal and the conditions from which the several curves were plotted follow:

Curve. 1. Methane from coal collected from the face of the fourth right entry, off the F face heading, in mine No. 6, at Monongah, December 13, 1907; bottled in vacuum January 23, 1908.

Curve 2. Same coal as No. 1. Crushed in vacuum on January 27 by means of coal crusher, and then placed in the vacuum bottle.

Curve 3. Methane from coal collected from room 3 on third right off second north heading, in mine No. 8, Monongah, December 12, 1907; bottled in vacuum January 23, 1908.

Curve 4. Same coal as No. 3. Crushed in vacuum in coal crusher January 28, and then placed in the vacuum bottle. Coal passed through 30-mesh sieve. Curve 5 Coal from the face of the east return air way in mine No. 8, Monongah. Collected December 17, 1907; bottled in vacuum February 10, 1908.

Curve 6. Coal from face of right main, Naomi mine. This is the most gassy point seen in the mine. Collected December 14, 1907; bottled February 11, 1908.

Curve 7. Coal from face of H manway, mine No. 6, Monongah. Collected December 13, 1907; crushed in vacuum March 17, 1908, and immediately placed in vacuum bottle.

Curve 8. Same coal as No. 7. Crushed in air under full barometric pressure on March 18, 1908, and immediately placed in vacuum bottle.

Curves 1, 3, 5, and 6 show the escape of methane from lumps of coal averaging approximately the size of a marble. Curves 2, 4, 7, and 8 indicate the volume of gas which escaped from coal crushed so that all of it would pass through a 10-mesh sieve, a considerable part of it being necessarily much more finely reduced than this.

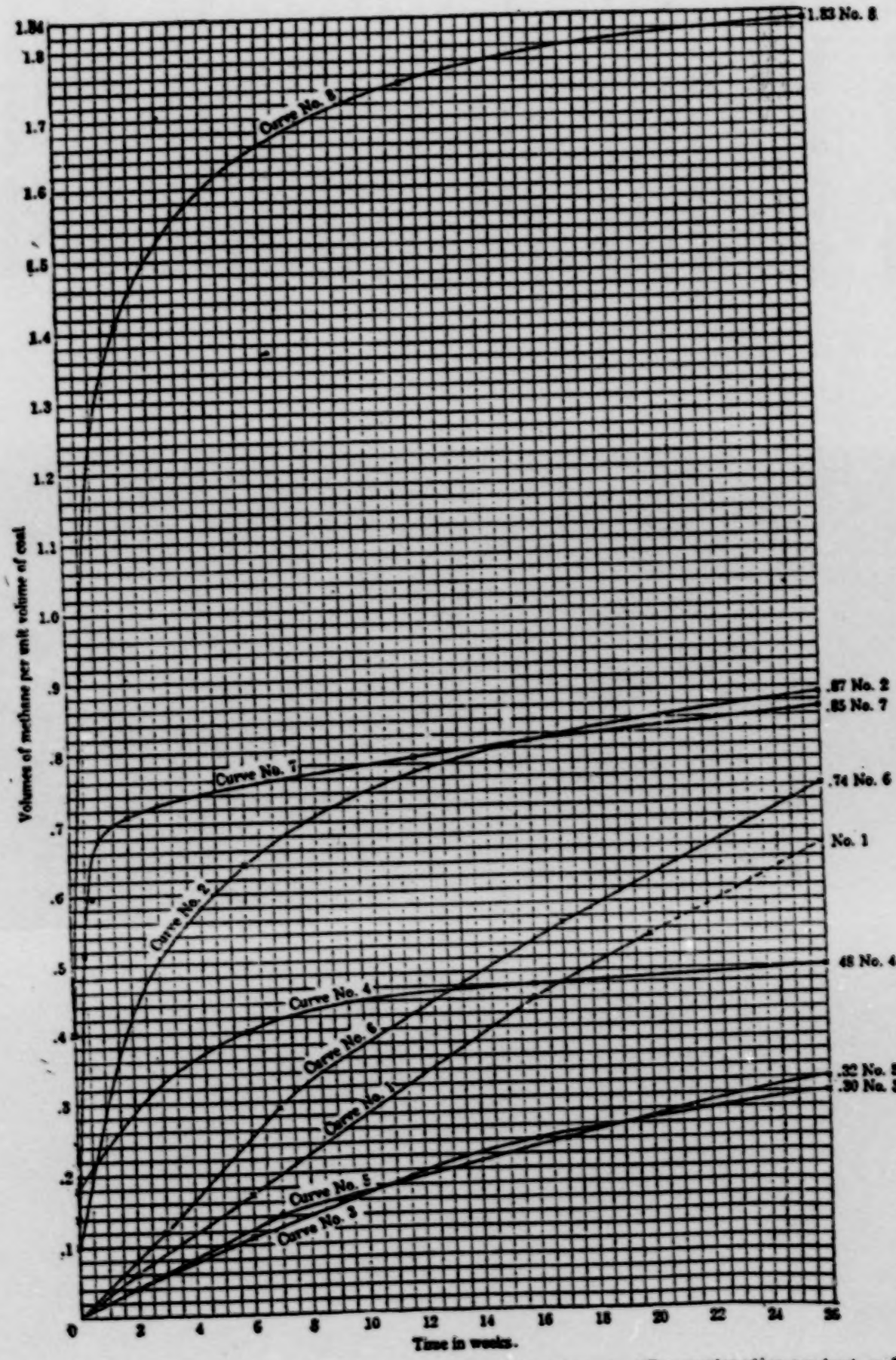

FIGURE 1.—Diagram showing rates of escape of methane from coal. (For explanation see text, p. 33.)

BEST AVAILABLE COPY

The volumes of methane liberated during the process of crushing are also included in these curves. Hence curves for the crushed coal instead of commencing at the zero point start at points on the vertical axis corresponding to the volume of methane lost during the process of crushing.

The four curves representing the lump coal show that the escape of methane from fragments of coal, even in a vacuum, takes place slowly and steadily and must in some cases continue for a very long period of time. Curve 1 is nearly a straight line, showing that the evolution of methane was nearly as rapid at the end of twenty weeks as when the coal was first placed in the vacuum. In the other three experiments the rate of escape declined more rapidly.

The relation between the size of the coal fragments and the rate of gas escape is strikingly shown by comparing the curves obtained from the crushed coals with those representing the same coals in lumps. Curves 1 and 2 were parallel experiments with the same coal, as were also curves 3 and 4. The finely-crushed coals gave out methane at a very rapid rate for a short time after being bottled, but the rate soon rapidly declined. In the experiments represented by curves 7 and 8 the escape was exceedingly rapid during the first week after the crushing, but had greatly slackened before the end of the second week. Bottles 2 and 4 were not opened until the end of the sixth week, so that these two curves are not so sharply bent.

It is clear from these experiments that the gas escapes more readily, and at first in greater volume, from the fine coal than from the coarser lumps, but that the supply of free gas held by the fine coal is more quickly depleted, while the loss from the lump coal is more uniform. After a time, therefore, the coarse coal gives off gas more rapidly than the fine. The graph shows that the curves for the same sample of coal approach each other and will

apparently come together in time, probably at a point where the gas supply of each has been practically exhausted. It seems probable, therefore, that the size of the coal, whether finely divided or in the form of coarse lumps, has little influence on the total amount of methane evolved in a sufficiently long period of time, but that it makes a very great difference in the rate at which the gas is given off. The phenomenon appears to be chiefly one involving the quantity of gas stored within the coal which can escape, and not one of gas generation during the interval of time.

Some of the results of these experiments on the rate of escape of gas from Monongah coal may be summed up in the following generalizations:

1. Reduction of pressure removes the gases from coal slowly—a matter of weeks and months.

2. Finely powdered, fresh coal gives off more methane during six months in a vacuum than the same amount of lump coal subjected to the same conditions. But presumably during a much longer period of time approximately the same volume of gas should be expected to come off from either type of coal.

3. Reduction of pressure, acting for only a few hours or even a few days, is far less effective in extracting the entrapped gas than crushing the coal, either in a vacuum or under barometric pressure.

4. Crushing coal to a certain degree of fineness yields approximately the same volume of methane whether the operation is performed in a vacuum or in an atmosphere of air or carbon dioxide.

5. Crushing the coal to the degree of fineness of which the crusher is capable removes only a minor proportion of the free gas stored within the coal. For Monongah coal already crushed, either in vacuum or under full atmospheric pressure, will yield more methane during

the next two weeks in a vacuum than was liberated during a process of crushing.

PRACTICAL SIGNIFICANCE OF RATE.

The escape of methane, which takes place slowly and steadily, even from small lump coal, and at a rate that is much influenced by the size of the coal, must continue very steadily for long periods of time from the solid coal in the mines. This means that throughout every portion of a mine, in the old workings as well as the new except in the portion of the seam near the surface from which the gas has been slowly escaping during long geologic ages), a steady outbreathing of methane gas is to be expected. This may be independent of recognizable "feeders" and "blowers" and may come from the massive coal, as well as from distinct cracks and fissures leading back to storage reservoirs. But because this gas escapes as slowly as it does steadily, it does not often become dangerous in mines where the ventilation is good; but old, abandoned workings, cut off from the rest of the mine and from the ventilation, soon fill with methane from this continual exhalation of gas.

A much greater danger lies in those more rapid outbursts of fire damp which unexpectedly flow into the new workings when a strong blower or reservoir of gas is encountered. Necessarily the quantity of gas suddenly forced into the workings must vary within extremely wide limits, depending on the nature and extent of what may, for convenience, be termed the storage reservoir. These so-called reservoirs of gas are, in reality, porous portions of the coal seam or adjacent strata, or a series of fissures, in which the gas has accumulated and is now stored, at many places under very great pressure. When a crack or fissure leading back to a region of stored gas is encountered in mining operations, an outflow of gas into the working results. Sudden falls of rock from the roof often open avenues of escape for pent-up gas. When lines of

communication with extensive reservoirs of stored gas are opened, large quantities of fire damp may flow into a portion of the mine in a short time and thus render the air in this part of the mine explosive. These lines of communication may be opened either in the ordinary mining operations or because of the formation of new lines of fracture accompanying the natural deformation movements of the strata. Settling of the overhead beds, together with a general redistribution of the strains caused by the removal of the coal, is likely to open new sets of fissures and seal old ones. Hence there may be periods of more gas and periods of less gas, depending on the local movements of the strata and the effect of such movements, by opening or closing fissures, on the facility with which the pent-up gases can find lines of egress. No appeal, however, is here made to seismic or volcanic disturbances in other parts of the world, whose influence on the local conditions must be trivial.

From these experiments it has seemed safe to conclude that the solid coal in the seam must continue to supply methane for long periods of time. This means that as the supply of gas collected in reservoirs is reduced by escape into the mine, the adjacent coal has a tendency to yield gas to replace that which is lost, until (in case the avenue of escape is cut off by movements of the strata or other causes) a state of approximate equilibrium is established between the gas distributed throughout the mass of the coal itself and that accumulating in the so-called reservoirs. If a reservoir of gas were tapped by boring and the gas removed, the reservoir would, in the course of time, be likely to become recharged, partly at least, with more gas supplied by the adjacent coal, provided the avenue of escape became closed. Just how rapidly a depleted reservoir might be resupplied with gas, and what bearing this factor has on practical mining, must be left an open question for the present.

EFFECT OF BAROMETRIC CHANGES.

When the lumps of coal were placed in the vacuum bottles and the air was exhausted by means of the mercury pump, it was found that the reduction of the pressure to a fraction of a millimeter caused the immediate escape of only a small quantity of methane. The exhaust air from the bottles of Monongah coal contained methane in volumes ranging up to 0.002 of the volume of the coal. Lumps of coal from the Naomi mine and the Mansfield mine at Carnegie, Pa., added similarly small volumes of methane to the exhaust air. Three samples of coal from the mine at Cardiff, Ill., gave only traces of methane, but a fourth, from a gassy portion of the mine, gave off 0.003 of its volume of methane. A bottle of anthracite coal from No. 1 north shaft of the Susquehanna Coal Company at Nanticoke, Pa., gave off methane to the extent of 0.03 of the volume of the coal while the air was being pumped out of the bottle. The time required to remove the air from these bottles was about twenty minutes. Thus a sudden drop of 740 to 750 millimeters in pressure within twenty minutes does not bring out a very large volume of gas. Experiments already described have shown that time is required to bring out the gas, even in a vacuum.

To discover how much more gas is given off from coal under low pressure than under the full barometric pressure, 20 pieces of bituminous coal from the Mansfield mine at Carnegie, Pa., were placed in a vacuum bottle and the air exhausted. At the same time 21 chunks of similar size, taken from the same collecting can, were placed in a bottle filled with air. The two bottles were then submerged side by side in a water jar. At the end of ten days the gas which had accumulated in the interval was pumped out and analyzed. The coal which had been bottled in a vacuum was found to have given up 0.25 of its volume of methane, while methane amounting to 0.14 of the volume of the coal had accumulated in the bottle

that had been filled with air. A similar experiment with two bottles of anthracite coal from Nanticoke, Pa., showed, after an interval of one week, exactly the same relative volume of methane in each bottle—1.07 times the volume of the coal. As in each experiment the volume of methane liberated was greater than the volume of oxygen which the coal absorbed from the air, the final pressure in the air-filled bottles was greater than the barometric pressure.

Low pressure aided the escape of gas from the bituminous coal, but it appears to have had little influence on the liberation of gas from this sample of anthracite coal. That identical volumes of methane should have escaped from the anthracite coal under such widely different pressures is perhaps to be regarded as largely a coincidence, for the distribution of gas is not uniform throughout the coal; but with about 20 fragments of the coal in each bottle, the gas content of the coal in one bottle should not differ greatly from that in the other. It is to be noted that, while the total pressure in each of these air experiments was very different from that in the parallel vacuum experiment, the partial pressure due to methane alone started at zero in each bottle and at the conclusion of the experiment with the anthracite coal had become as great in one bottle as in the other. In considering the influence of barometric fluctuations on the volume of gas exhaled by the coal in the mines, however, it is the total gas pressure which is of significance, rather than the partial pressure due to methane.

It would seem therefore that even the greatest fluctuations of the barometer, which do not exceed 40 millimeters, can not have very great influence on the volume of gas escaping from the interstices of the coal itself. But in the case of feeders and blowers, in which the gas escapes for the most part directly from accumulations stored within more or less connected systems of fissures and zones of fracture, instead of from minute pores in the coal, the

effect of the diminution of pressure probably is more marked. This should be particularly true wherever the stored gas is under only a moderate pressure and the pathway of escape into the mine workings is readily followed; the strong blowers coming from the reservoirs far back in the coal, where the gas is held under high pressure and communication with the coal surface is more difficult, are necessarily much less affected by the relatively slight barometric changes.

Heise and Herbst bring out the point that, although frequent measurements have shown that the gas stored up in the fresh, undisturbed coal often is under pressure amounting to several atmospheres, these high pressures are obtained only by boring several meters back into the coal; and that close to the coal face the gas is under a pressure but slightly in excess of the barometric pressure.[a] Blower gas, in that portion of its course which is near the orifice, is under only a slight pressure, so that an increase in the barometric pressure adds resistance to its outflow, causing it to slacken, whereas with a falling barometer the outflow of gas must become more active. In this way the common observation that the outflow of gas from blowers increases with a falling barometer and slackens perceptibly with a rising barometer is shown to be entirely consistent with the high gas pressures that have been found to exist in the undisturbed coal some distance from the exposed face.

The influence of barometric changes on the outflow of air and gas into the active workings from old abandoned entries which are not completely walled off from the rest of the mine is well known and does not fall within the scope of this discussion.

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[a] Heise and Herbst, Bergbaukunde, vol. 1, 1908, pp. 458-461.

GASES OBTAINED BY HEATING COAL.

Meyer,[b] Thomas,[c] Bedson,[d] Trobridge,[e] and other investigators have extracted gases from coal with the aid of heat, by warming the coal generally up to the boiling point of water, and in some experiments as high as 200° C. In many tests the higher members of the paraffin series, such as ethane, propane, and butane, were obtained in considerable proportions. At least one gas of the olefin series was often present in notable quantities.

The present analyses of feeder gas from the mines and of the gas which slowly escaped from the coal bottled in a vacuum, as well as of that liberated directly by crushing the coal in the rock crusher, do not reveal the presence of any such high proportions of the heavier hydrocarbons. But these gases were all extracted at ordinary temperatures. As the constituents of coal include various hydrocarbon compounds, some of which may be supposed to be partly decomposed or volatilized at even moderate temperature, there comes to mind the suggestion that a portion of the olefins and higher paraffin gases obtained from these European coals, instead of existing within the coal in the free state, may have been produced from chemical decomposition induced by the heat employed. To test this possibility, parallel experiments were undertaken. A can of fresh bituminous coal from the Pittsburg district being selected for this test, one portion of the coal was stored for thirty days in a vacuum bottle; a second portion was pulverized on an anvil so as to pass through a 10-mesh screen, and then quickly placed in a suitable glass tube connected with the mercury pump, and the air re-

[b] Von Meyer, Ernst, Jour. Chem. Soc., vol. 25, 1872, pp. 798-801.

[c] Thomas, J. W., Jour. Chem. Soc., vol. 28, 1875, pp. 793-822, and vol. 30, 1876, pp. 144-152.

[d] Bedson, P. Phillips, and McConnell, W., Trans. Fed. Inst. Min. Eng., vol. 3, 1892, pp. 307-310; vol. 7, 1894, pp. 27-53.

[e] Trobridge, F. G., Jour. Soc. Chem. Ind., vol. 25, 1906, p. 1129.

moved. This tube was then kept for three hours successively at 50° (water bath), 100° (boiling water), 150° (oil bath), and 200° (metal bath). The gas obtained during three hours at each temperature was collected and analyzed. The same experiment was then repeated with anthracite coal from the vicinity of Scranton, Pa. The results, expressed in volume of each gas relative to the volume of the coal as unity, are given in the following tables:

Analyses of gases obtained from coal in a vacuum at different temperatures.

[Tabular Matter Omitted]

The other portions of these two coals were kept in vacuum bottles at low pressures for thirty days. At intervals during this period the gas which had accumulated was pumped out and analyzed, in order to furnish additional data on the rate of methane liberation (see pp. 33-36). The gas was pumped from the bottle containing the bituminous coal at the end of each ten days; from the anthracite at the end of each week, except that the fourth period was extended to nine days to complete the full thirty days.

Of the different portions of the gas analyzed, the last portion in each test furnishes the truest index to the character of the gas given off by the coal when allowed to stand under reduced pressure, as after the removal of several portions of gas the extraneous nitrogen resulting from air still adhering to the coal when bottled, has been largely removed. The gas was still coming off rapidly at the end of the thirty days.

The following table indicates the character of the last portion of the gas obtained from these two vacuum bottles:

Analyses of gases given off by coal during last 10 of 30 days in a vacuum.

[Tabular Matter Omitted]

Ethane was present in the gas from the anthracite coal, if at all, only in small quantities. In two of the four analyses made of the gas from this coal the result of the explosion determinations indicated a small amount of hydrogen instead of higher paraffins. The explosions in the other two analyses pointed to the presence of a small proportion of ethane accompanying the methane.

A comparison of the three tables shows that for these two coals the gas extracted by heating the material up to 200° C. is somewhat, though not radically, different from that which slowly exudes from the coal when bottled for a period at ordinary temperatures. The heat caused the expulsion of such uncombined gas as was ready to escape at ordinary temperatures, and in addition developed some new gas from the nongaseous constituents of the coal. Most conspicuous among these new products were the vapors of hydrocarbons which at ordinary temperatures are normally liquids. Benzene was probably the most prominent of these vapors. The hydrocarbon vapors began to appear in notable quantities at 100° and increased in importance as the temperature was elevated. The volume of ethane also rose slowly with the increase of heat, suggesting that some of this gas did not come from a state of mechanical imprisonment in the pores of the coal, but was produced by chemical action induced by the heat. Gases of the ethylene series remained unimportant, even up to 300°, in the experiments with the anthracite coal.

The high proportions of higher hydrocarbon gases obtained by Meyer, Thomas, and Bedson by heating German and English coals up to 200° were not found in the gas from these two samples of Pennsylvania coal. By heating dust from the Darr mine up to 350°, however,

both olefins and higher paraffins, which at lower temperatures had appeared only in moderate quantities, were made important constituents of the gas evolved. (See tables on pp. 57-58.) Such gases could have come only from chemical action or from a state of true occlusion, for they must inevitably have been liberated in considerable volume at the lower temperatures as well had their liberation been merely a question of escape from the interstices of the coal. Substantiating this view in a measure is the testimony afforded by the vacuum bottles. These experiments show, at least as regards the coals used in these investigations, that the gas slowly coming off from the crushed coal at the end of a period of six months at very low pressures is not notably richer in the higher members of the marsh-gas series than the gas rapidly exhaled at the beginning of the experiments. These higher hydrocarbons do not diffuse and transpire so rapidly as methane, but if they were present in any considerable volume, mechanically held within the pores of the coal, as is the methane, a period of six months would seem sufficient to permit their escape in notable proportions.

SURVEY PUBLICATIONS ON FUEL TESTING AND MINE ACCIDENTS.

The following publications, except those to which a price is affixed, can be obtained free by applying to the Director, Geological Survey, Washington, D. C. The priced publications can be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Bulletin 261. Preliminary report on the operations of the coal-testing plant of the United States Geological Survey at the Lousiana Purchase Exposition, in St. Louis, Mo., 1904; E. W. Parker, J. A. Holmes, M. R. Campbell, committee in charge. 1905. 172 pp. 10 cents.

Professional Paper 48. Report on the operations of the coal-testing plant of the United States Geological Survey at the Louisiana Purchase Exposition, St. Louis, Mo., 1904; E. W. Parker, J. A. Holmes, M. R. Campbell, committee in charge. 1906. In three parts. 1,492 pp., 13 pls. $1.50.

Bulletin 290. Preliminary report on the operations of the fuel-testing plant of the United States Geological Survey at St. Louis, Mo., 1905, by J. A. Holmes. 1906. 240 pp. 20 cents.

Bulletin 323. Experimental work conducted in the chemical laboratory of the United States fuel-testing plant at St. Louis, Mo., January 1, 1905, to July 31, 1906, by N. W. Lord. 1907. 49 pp. 10 cents.

Bulletin 325. A study of four hundred steaming tests, made at the fuel-testing plant, St. Louis, Mo., 1904, 1905, and 1906, by L. P. Breckenridge 1907. 196 pp. 20 cents.

Bulletin 332. Report of the United States fuel-testing plant at St. Louis, Mo., January 1, 1906, to June 30, 1907; J. A. Holmes in charge. 1908. 299 pp.

Bulletin 333. Coal-mine accidents, a preliminary report by Clarence Hall and W. O. Snelling. 1907. 21 pp.

Bulletin 334. The burning of coal without smoke in boiler plants; a preliminary report, by D. T. Randall. 1908. 26 pp. 5 cents. (See Bull. 373.)

Bulletin 336. Washing and coking tests of coal and cupola tests of coke, by Richard Moldenke, A. W. Belden, and G. R. Delamater. 1908. 76 pp. 10 cents.

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Bulletin 343. Binders for coal briquets, by J. E. Mills. 1908. 56 pp.

Bulletin 362. Mine sampling and chemical analyses of coals tested at United States fuel-testing plant, Norfolk, Va., in 1907, by J. S. Burrows. 1908. 23 pp. 5 cents.

Bulletin 363. Comparative tests of run-of-mine and briquetted coal on locomotives, including torpedo-boat tests and some foreign specifications for briquetted fuel, by W. F. Goss. 1908. 57 pp., 4 pls.

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Bulletin 367. Significance of drafts in steam-boiler practice, by W. T. Ray and Henry Kreisinger. 1909. 61 pp.

Bulletin 368. Washing and coking tests of coal at Denver, Colo., by A. W. Belden, G. R. Delamater, and J. W. Groves. 1909. 54 pp., 2 pls.

Bulletin 369. The prevention of mine explosions, by V. Watteyne, C. Meissner, and A. Desboronugh. 1908. 108 pp.

Bulletin 373. The smokeless combustion of coal in boiler plants, by D. T. Randall and H. W. Weeks. 1909.

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BULLETIN 394

PAPERS ON THE

CONSERVATION OF MINERAL RESOURCES

Reprinted From Report of the
National Conservation Commission, February, 1909

WASHINGTON
GOVERNMENT PRINTING OFFICE
1909

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PAPERS ON THE CONSERVATION OF MINERAL RESOURCES.

INTRODUCTION.

This volume is a reprint of selected papers on the conservation of mineral resources, written by members of the United States Geological Survey in response to executive order, for the report of the National Conservation Commission (S. Doc. No. 676, 60th Cong., 2d sess.). Nearly all the information from which these papers are compiled had previously been collected by the Geological Survey in the performance of its regular duties. Since the organization of the Survey the mineral resources of the nation have been the principal subject of its investigations, and the data on which are based the estimates of the reserves of mineral fuels and ores are the results of nearly thirty years of official work. The report on the coal fields is practically a restatement of the information set forth on the coalfield map published in May, 1908, before the appointment of the National Conservation Commission; the other inventories constitute a summation of work in which the authors had been engaged as members of the Survey. The printing of the conservation report has furnished an opportunity to present these reprints in convenient form and, as the demand for the larger report will greatly exceed the edition authorized, this segregation of the papers relating to minerals will prove useful.

[Map of Distribution of Coal Fields in the United States Omitted]

COAL FIELDS OF THE UNITED STATES

By MARIUS R. CAMPBELL and EDWARD W. PARKER.

INTRODUCTION

According to the estimates prepared by the U. S. Geological Survey, the area underlain by workable coal beds in the United States is 496,776 square miles. Of this total area, 480 square miles contain the entire anthracite coal fields of Pennsylvania. The bituminous coal fields are estimated to be contained in an area of 250,051 square miles. The grade of coal between bituminous and lignite, which is designated by the Geological Survey as "subbituminous," is estimated to be contained within areas aggregating 97,636 square miles, while the areas containing lignite aggregate 148,609 square miles. The coal fields are divided, for the sake of convenience in classification, into six provinces, as follows (see Pl: I):

1. The eastern province, containing the anthracite coal fields of Pennsylvania and the bituminous coal fields of the Appalachian region, i.e., those of western Pennsylvania, Ohio, Virginia, West Virginia, Kentucky, Tennessee, Georgia, Alabama, and small outlying areas of North Carolina.

2. The interior provinces, containing the bituminous coal-producing regions of Michigan, Illinois, Indiana, western Kentucky, Iowa, Kansas, Missouri, Oklahoma, Arkansas, and Texas.

3. The Gulf province, containing the lignite areas of Alabama, Mississippi, Louisiana, Arkansas, and Texas.

4. The northern Great Plains province, containing the lignite subbituminous areas of North and South Dakota, eastern Montana, and northeastern Wyoming.

5. The Rocky Mountain province, containing the bituminous and subbituminous areas of western Montana and western Wyoming, Colorado, Utah, and New Mexico.

6. The Pacific coast province, containing the areas of Washington, Oregon, and California.

During the last few years the Survey geologists have worked in all of these coal areas and have also been making careful estimates of the quantity of coal contained in the beds when mining first began. In making these estimates care has been taken to ascertain how much of the supply is easily available and how much is either not available under present mining and market conditions or is available with extreme difficulty. According to these estimates the quantity of coal contained within the known area of the United States when mining first began was 3,076,204,000,000 tons. Of this quantity a little less than two-thirds, or 1,922,979,000,000 tons, is considered as coal that is easily accessible of minable under present conditions, while slightly more than one-third, or 1,153,-225,000,000 tons, is considered as non-minable under present conditions or accessible with extreme difficulty. It should be remembered, however, that the quantity of coal given above as easily accessible includes the lignites and subbituminous coals of the Western States, of which approximately 530,000,000,000 tons, while easily accessible, can not be considered available under present conditions or those which may be expected in the near future. This would reduce the original supply of easily accesssible and available coal to approximately 1,400,000,000,000 tons.

The area of the different provinces and the quantity of coal contained therein when mining first began are shown in the following table:

Tonnage (short tons), by provinces and accessibility.

[Tabular Matter Omitted]

The distribution of this original supply of coal, according to grades and accessibility, is shown in the following table:

Tonnage (short tons), by grades of coal and accessibility.

[Tabular Matter Omitted]

The first mining of coal in a commercial way, in the United States, was in what is known as the Richmond basin, a small area in the eastern part of Virginia. Small quantities of coal had been mined here in the latter part of the eighteenth century and it was also in the latter part of the eighteenth and the beginning of the nineteenth centuries that efforts were being made to introduce anthracite coal for fuel purposes. The first actual records of the production of Virginia coal were in 1822, in which year it was reported that 54,000 tons were mined. In 1820 (two years before) 365 long tons of anthracite coal, or 1 ton for each day of the year, had been shipped to distant markets. From these small beginnings of less than a century ago the production of coal has increased until in 1907 the total output of anthracite and bituminous coal approximated 500,000,000 tons. In 1837 the total production of the United States reached, for the first time, a total exceeding 1,000,000 tons, the output being reported from 4 States only—Pennsylvania, Virginia, Kentucky, and Illinois—although Maryland also was producing a small quantity of coal at that time. In 1840 the production amounted to a little over 2,000,000 tons, the output being reported from 13 States. Ten years later, in 1850, the production amounted to 7,000,000 tons; in 1860 it was over 14,000,000 tons; in 1870 over 33,000,-000 tons; in 1890 it approximated 160,000,000 tons; in 1900 it was nearly 270,000,000 tons; and in 1907 it was 480,000,000 tons. The aggregate production to the close of 1907 has amounted to 6,865,097,567 short tons.

Up to the close of 1845 the total production of coal in the United States was 27,700,000 short tons, and since that time the drain on the supply has practically doubled with each decade. The total production to 1845 and decenntially since that time has been as follows:

	Short tons
Up to 1845	27,677,214
1846-1855	93,417,827
1856-1865	173,795,014
1866-1975	418,425,104
1876-1885	847,760,319
1986-1995	1,586,008,641
1896-1905	2,832,402,740
1900-1907	894,520,702
Total	6,805,097,567

It is estimated that for every ton of coal mined and sold, half a ton is lost or wasted, so that the total production of 6,865,097,567 short tons to the close of 1907 represents an exhaustion of 10,200,000,000 tons, or 0.3 per cent of the total original supply, or 0.7 per cent of the coal which is easily accessible and available under the present conditions. The total supply of easily accessible and now available coal left in the ground at the close of 1907 was 1,382,780,000,000 short tons.

Accompanying this statement two charts are presented, one showing the production of coal annually from 1840 to 1907, the other illustrating the average annual production by progressive ten-year periods for the same length of time, the latter chart having been prepared in order to eliminate minor variations due to abnormal conditions. The average annual increase in coal production figured from the average of progressive decades shown on the second diagram is 7.36 per cent, and for the last five progressive decades—1894-1903 to 1898-1907—the rate of increase has been above that average.

DURATION OF SUPPLY.

The total reserve of easily accessible and now available coal is estimated at 1,382,780,000,000 tons. The assumption that a constant output has been reached would be utterly unwarranted. On the other hand, the adoption of the flat rate of annual increase of 7.36 per cent would involve the improbable assumption that the marvelous record of the past and present will be maintained in the future and the production would continue to approximately double every decade. Using the waste allowance, on the basis of this constant rate of increase in producton, the 1,382,780,000,000 tons available at the close of 1907 would be exhausted in one hundred and seven years, or by 2015 A. D. Against the use of the flat rate of increase it may well be contended that just as the rate of increase in population tends to diminish, so this rapid increase in per capita consumption of coal cannot persist, and a constant annual production will be reached. However, the figures set fifty years ago by statisticians for the probable constant annual production of coal in England have already been exceeded by over 160 per cent.

Mr. Henry Gannett has made an estimate based upon a decreasing rate of increase calculated from twenty-year averages of production. The use of ten-year averages is regarded as unsatisfactory for the reason that one of the decades may consist mainly of a period of prosperity, while the preceding and succeeding decades contain periods of business depression. The twenty-year period, however, is sufficently long to include a period of prosperity with one of business depression. Taking the four twenty-year periods since 1828, three rates of increase are obtained which show a rapid decrease. The hyperbolic curve computed from these successive rates of increase will indicate the constantly diminishing rate of increase for the successive twenty-year periods. The result obtained by this method is that the easily accessible and available coal will be exhausted about the year 2027, and all coal by the middle of that century. It is recog-

nized that the data upon which this curve has been constructed are few and the curve correspondingly weak. However, in the above estimate all of the data have been given which it is possible to use, and this estimate is believed to represent the best use that can be made of the data at hand.

Inasmuch as America leads the world not only in present production of coal, but also apparently possesses the greatest reserve and certainly is mining coal at much lower cost than any other country, the obvious tendency will be for European countries to look more and more to the United States for their coal supply. Therefore, while our present coal production and consumption are practically equivalent, the export of coal, unless prohibited by federal legislation, must eventually become a factor and increase the coal production in the United States beyond the demands of home consumption. On the other hand, powerful influences will come to bear upon coal production, which favor lengthening the life of the supply. Thus it is to be hoped that with more improved methods in the utilization of coal the increased efficiency per unit may act as a factor in reducing coal consumption, and improved mining methods should likewise decrease the waste percentage. The increased utilization of water power should also tend to decrease coal consumption. Again, as soon as the end appears in sight prices will rise and production diminish, and that progressively. This interference with the law of decreasing increase produced by growing scarcity will of course, prolong the life of our coal reserves, but at the same time will greatly hamper our industries that depend on this fuel.

With so many indeterminate factors whose importance is realized but can not be measured, prophecy must possess a questionable value.

WASTE IN COAL MINING.

The principal loss or waste attending coal-mining operations is that represented by the quantity of coal necessarily

left in the ground as pillars to support the roof. In some cases it is also necessary to leave a foot or more of coal as a part of the roof, because of the unstable character of the material overlying the coal, which itself does not make a good roof. It has also been frequently the case that, where portions of the coal bed have been of inferior quality, only the high-grade coal has been mined and the poorer material left. The coal left as pillars, or as portions of the roof, may be considered a necessary loss, but that which is left because of its inferior quality can not be considered unavoidable waste in any sense, and is frequently of higher grade than coals mined and used in other portions of the country.

Enormous quantities of coal have been lost beyond recovery from the mining of beds lying below, the caving of which, upon the withdrawal of the pillars, has so broken up the overlying strata as to render it impossible to recover the coals contained therein. This has been particularly the case in some of the coal beds of western Pennsylvania, but much improvement has been observed in this regard within later years. Notwithstanding the improvement in this respect it is probable that a large amount of coal will be wasted in the Western States, where a great number of coal beds are closely associated, and also where the intercalated strata are weak, forming poor roofs to the mines.

There are no exact figures as to the actual loss or waste sustained through coal left in the mines in conducting the mining operations, but it has been estimated that it amounts to 50 per cent of the quantity produced and marketed. In some cases, through careful mining and where the conditions are ideal for working, practically all of the contents of the coal beds are recovered. In other cases, particularly when the beds are of enormous thickness, the recovery has not exceeded 30 per cent of the contents. During the earlier days of mining in the anthracite regions of Pennsylvania it was estimated that only

40 per cent of the coal was marketed. This was partly due to uneconomical methods of mining, and partly to the large amount of culm, for which there was at that time no market and which was piled on the ground in unsightly mountains. At the time of the Anthracite Coal Waste Commission, which made its report in 1893, 40 per cent was still considered a maximum recovery. So far as underground workings are concerned, there has been no revolution in the methods employed since that time, but there has been a considerable improvement in the application of those methods, which has resulted in the recovery at the present time of a materially larger proportion of the coal in the ground than was the rule at that date. The earlier methods of mining consisted in leaving comparatively narrow pillars, and in the mining of large rooms the result was that the pillars were not strong enough to stand the pressure and were crushed beyond recovery. It is now customary to use larger pillars between the rooms, which makes it possible to better control the roof during "robbing" operations and to eventually recover a larger proportion of the contents of the bed.

Material improvements have also been made in the methods of the preparation of coal, so that a much greater proportion of the product hoisted is now being sent to market in merchantable condition. Part of this is due to better and more systematic methods of handling, and part to the saving of small sizes which formerly went to the culm banks. The higher prices of coal and the development of methods for using these small sizes have also made it possible, through washing processes, to rework the small coal formerly thrown on the clum banks, and these are now furnishing several millions of tons of marketable coal annually.

Under present conditions, except in cases where the surface must be maintained, it is estimated that in the Wyoming region of the Pennsylvania anthracite field the recovery for market is from 60 to 64 per cent. In the

Lehigh, Mahanoy, and Schuylkill regions the recovery for shipment is estimated at 56 per cent.

When the Anthracite Coal Waste Commission [a] made its report in 1893 the shipments of anthracite had amounted to 820,362,995 long tons, and the total production was estimated to have been 902,000,000 long tons. The commission estimated that for every ton produced, 1½ tons were lost, and the total exhaustion was estimated at 2,255,000,000 long tons. The estimated original contents of the field were 19,500,000,000 tons, and the estimated contents remaining at the beginning of 1893 were 17,245,000,000 tons.

The commission in its report (p. 149) says:

> It is to be doubted whether the total coal won when the field shall be abandoned will exceed 40 percent of the total contents. An estimate on that basis would show the available marketable coal still now in the ground to be as follows:

	Tons
Wyoming region	1,859,000,000
Lehigh region	477,500,000
Schuylkill region	4,581,500,000
In all	8,898,000,000

> The amount of coal won at the modern colliery due to improvements in mining methods, in the appliances for handling the coal, and in the utilization of the small sizes shows a decided advance over the earlier years of mining; a still further advance will undoubtedly be made in these directions, and the mining of the small beds, where a larger per cent can be won, will all tend to increase the total. Future estimates for a long time will in all probability show an advance in the total per cent won.

What the commission predicted in the foregoing paragraph has to some extent already been accomplished, from

[a] The members of the commission were Eckley H. Coxe, of Drifton; Heber S. Thompson, of Pottsville; and William Griffith, of Scranton, Pa.

the fact that coal is now being mined from beds that were not considered a part of the available reserves when the commission made its report. In mining methods, as previously stated, there has also been a marked improvement, and the writers are of the opinion that it is safe to assume that since 1893 the 1 ton of coal lost for every ton mined is nearer the actual results than 1½ tons lost for each ton mined, and at this rate the available supply at the beginning of 1893 would have been 8,622,500,000 tons instead of 6,898,000,000 tons. The total production from 1893 to the close of 1907 has amounted to 833,187,445 long tons, which deducted from the estimated available supply of 8,622,500,000 tons would leave as the remaining available supply 7,789,312,555 long tons, it being understood that this is only one-half of the coal left in the ground untouched. What may be done in the future in the way of recovery of coal which is now considered an absolutely necessary waste and lost for all time is, of course, a matter of conjecture.

In the mining of bituminous coal it is estimated that for every ton of coal produced for market one-half of a ton is lost or wasted. The part of this which is represented by the coal left in the mines for pillars, etc., may be materially reduced, but in many cases the recovery of a larger percentage of the coal in the ground can be obtained only by an increased cost of mining; and this in the face of the over-developed properties, keen competition, and low selling prices is incapable of accomplishment at the present day unless there be concerted legislative action by the governments of the several States.

There is another and a serious loss or waste in bituminous coal mining which is, like the culm in the anthracite fields, represented by the slack or fine coal necessarily or unnecessarily produced in mining operations. This is particularly the case when the coal is of the "dry" or noncaking variety which can not be used for coke making or which, because it does not fuse in the fire box, fails to make a satisfactory steam fuel. Many

thousands of tons of this "slack" coal are thrown on the ground each year, and much of it is burned in order to prevent it from "cumbering the ground" or adding extra weight above the mine workings. A large part of this waste could be presented by briquetting, but the process of briquetting adds about $1 per ton to the cost of the fuel, which renders competition with the cheap fuel in the shape of raw coal impossible. Two of the causes which lead to the production of unnecessarily large quantities of slack are the excessive use of powder and the practice of "shooting from the solid." These reduce the percentage of large-sized or marketable coal and naturally increase the cost of that portion of the product.

Legislation prohibiting shooting from the solid, which would provide penalties for excessive use of powder, would have as one result a larger percentage of lump coal; and thus in a measure enable operators to assume the additional expense involved in the briquetting of such slack coal as is unavoidably produced.

This legislation is the province of the state governments, and it is not too much to hope that before long laws may be enacted against the accumulation of slack heaps or their useless destruction by burning, and this waste prohibited, as that of natural gas has been in some cases.

The question of the waste in the combustion or utilization of coal does not come within the scope of this paper, but as the manufacture of coke is, in reality, a preparation of the fuel for use, attention may properly be called to the enormous waste resulting from beehive oven practice (the method commonly employed in the United States).

In what is known as the beehive oven (so called because of its similarity in shape to the conventional beehive) the coal is partially consumed, or, more properly speaking, the volatile combustible contents are consumed and all of the valuable constituents of the coal, except the fixed carbon, which is left behind as coke, are wasted. These

wasted constituents consist of gas, tar, and ammonia. In what are known as by-product recovery ovens, however, the process is one of distillation and the by-products of tar and ammonia and all of the gas, except that used for heating the ovens, are recovered and used.

The United States is far behind Germany and other foreign countries in adopting the economies resulting from the coking of coal in by-product ovens. In Germany at the present time little or no coke is made except in retort ovens. The first ovens of this type in the United States were built in 1898 at Syracuse, N. Y. Up to the close of 1907 the total number of this type of ovens completed was 3,892, while the number of beehive ovens in operation in that year was 94,746. The production from the retort ovens was 5,607,899 short tons of coke and that from beehive ovens 35,171,665 tons.

When the economies which may be effected by the use of the retort ovens have been so clearly demonstrated, not only by the plants which have been constructed in the United States, but more emphatically through the much more extensive development of by-product coke manufacture in Europe, the condition in the United States, as shown by the statistics for the last four years, is somewhat difficult to understand. As previously stated, the production of coke in the by-product ovens of the United States in 1907 amounted to 5,607,899 short tons. It was valued at $21,665,157. The total value of by-products obtained in the manufacture of this coke was $7,548,071, this value and the quantity being distributed as follows:

Value of by-products obtained in manufacture of coke in retore opens in 1907.

[Tabular Matter Omitted]

The gas included in the foregoing statement is the "surplus" not consumed in the coking process and is either sold or used at manufacturing establishments operated in

connection with the coke-oven plant. In a few instances where the surplus gas is consumed by the producing companies the quantity is not measured, nor was any value placed upon it in the reports made to the United States Geological Survey. In such cases careful estimates have been made, based upon the average surplus gas obtained from similar coals used at ovens of the same type. The value, similarly estimated, has been placed at from 10 to 15 cents per thousand cubic feet.

The coal consumed in retort ovens in 1907 amounted to 7,460,587 short tons. The quantity of coal used in beehive ovens was 54,485,522 short tons, from all of which the possible by-products are apparently wasted. Assuming that the coal consumed in beehive ovens was of the same average quality as that charged into the retort ovens and that the prices would be not less than 80 per cent of those ruling in 1907, the value of recoverable products which were thus apparently wasted last year amounted to $44,000,000, a sum equal to nearly 80 per cent of the total value of all the coal used in beehive ovens during the year. At the prices which prevailed in 1907 the value of the by-products wasted in beehive coke ovens was a little over $55,000,000.

The value of the by-products from the retort ovens in 1907 was a little more than one-third the value of the coke produced in them.

It should be remembered, however, that beehive ovens are located in the coal-mining regions and that the cost of the coal charged into them represents only a little more than that represented by the expense of mining the coal, whereas in locating by-product recovery plants provision must be made for utilizing or marketing the by-products. It is for this reason that in much the larger number of cases the recovery plants are established near the larger cities and at considerable distances from the mining regions, and the expense of transportation is added

to the mining cost of the coal. Hence it is that the value of the coal charged into by-product ovens in 1907 was $15,874,430, or over $2 per ton, while that of the coal used in beehive ovens was $56,956,008, or $1.05 per ton. It must also be remembered that the original cost of installation for a by-product plant is from four to five times that of a beehive plant of equal capacity. These disadvantages are in turn partly offset by the higher percentage of yield of coke in the retort ovens and a lower delivery charge on the coke produced. In the case of beehive coke, railroad transportation expense is borne by the coke, while in retort-oven practice all, or nearly all, of the freight charge is borne by the coal.

The total value of the 5,607,899 tons of by-product coke produced in 1907 was 21,665,157, an average of $3.86 per ton. The value of the 35,171,665 tons of beehive coke made in 1907 was $89,873,969, or $2.56 per ton. If we consider that the difference in the value of the by-product coke and beehive coke was due only to the difference in freight charges, then the total value of the entire product of beehive coke made in 1907 would, if made in retort ovens close to the market, have been $135,750,000. On adding to this the value of the by-products that should have been recovered, amounting to $44,000,000 at 80 percent of the market price in 1907, the total value of the coke and by-products would have amounted to nearly $180,000,000 instead of the value of $89,873,969 for the beehive coke alone. The value of the coal charged into these ovens, however, would have been $108,879,870 instead of $56,956,008. Carrying the hypothesis further, the difference between the value of the coke and by-products if the coal had been coked in retort ovens and the value of the coke alone from the beehive ovens was, say, $90,000,000. From this should be deducted the difference between what the value of the coal would have been at retort ovens and what it was at beehive ovens, i.e., $52,000,000. The remainder ($38,000,-

000), less the difference in operating expenses, wear and tear, interest on capital, etc., may be considered as approximately the actual net loss in value as the result of beehive coke production compared with by-product coke practice in 1907.

One of the reasons that has been given for the apparent lack of progress in retort-oven building in the last four years is the lack of profitable markets for the by-products of coal tar, and this has contributed to the backwardness of the United States in the development of the chemical industries depending upon coal tar as a raw material, and yet this country is importing coal-tar products to the value of several million dollars annually. It is also well known that the development of the coal-briquetting industry has been retarded because of the lack of assurance of a satisfactory supply of suitable coal-tar pitch for binding material, and there is also an increasing demand for creosoting oils for the preservation of timber.

COAL SUPPLY, PRODUCTION AND EXHAUSTION, BY STATES.

Alabama.—As far as known the earliest record of the existence of coal in Alabama was made in 1834. The first statement of production is contained in the United States Census Report for 1840, in which year the production is given at 946 tons. In 1907 the production was 14,250,454 tons, and the total production from 1840 to 1907 amounted to 164,734,310 short tons, which represented an exhaustion, including the waste in mining, of 247,000,000 tons. The total coal-bearing area of the State is estimated at 14,430 square miles, and the original coal supply is estimated to have been 68,903,000,000 short tons. The exhaustion to the close of 1907 represents a little over 0.3 of 1 per cent, and the production in 1907 was a little over 0.02 of 1 per cent of the estimated original supply.

Arizona.—A small area of 30 square miles in Arizona is estimated to contain 60,000,000 tons of coal, from which there had been no production at the close of 1907.

Arkansas.—As in Alabama, the first production of coal reported in Arkansas was in the census year 1840, when 220 short tons were reported as having been mined in that State. The industry in Arkansas did not develop rapidly during the early years, as the census of 1860 shows a production of only 200 tons, and that of 1880 a total of 14,778 tons. During the last twenty years, however, there has been a marked increase in the production of coal in Arkansas, and the maximum output was reached in 1907, with a total of 2,670,438 short tons. The total production to the close of 1907 amounted to 23,756,401 short tons, equivalent to an exhaustion of approximately 36,000,000 tons. The estimated original supply of coal in Arkansas was 1,887,000,000 short tons, of which the exhaustion to date represents practically 2 per cent The production in 1907 was equivalent to 0.15 of 1 per cent of the estimated original supply. The total area in Arkansas which contains workable coal or which may contain workable coal or lignite is estimated to be 7,584 square miles.

California.—The coal fields of California consist of scattered areas, of which, with few exceptions, comparatively little is known. The total workable area is estimated to be 500 square miles, and the original contents of the field 1,000,000,000 short tons. Mining in California had its beginning, according to the records of the state mining bureau, in 1861. The maximum production was reached in 1880, since which time the production has been irregular and has shown a declining tendency, this being due in the last few years to the increased production of oil in the State and its use for fuel purposes. The total coal production to the close of 1907 was 5,030,945 short tons, eqivalent to an exhaustion of approximately 7,000,000 tons, or 0.7 per cent of the original supply.

Colorado.—Colorado is one of the Western States which is rich in coal resources. The estimated total area of the coal fields is 17,180 square miles, and the original contents of these fields are estimated to have been 371,770,000,000 short tons. Coal production began in Colorado in 1864, but it was not until 1882 that the output reached as much as 1,000,000 short tons. Since that date there has been a steady increase in production, until in 1907 it amounted to 10,790,236 short tons. The aggregate production to the close of 1907 was 112,668,336 short tons, of which the equivalent exhaustion has been 169,000,000 short tons, which represents a little over 0.05 of 1 per cent of the original supply. The production in 1907 was approximately 0.004 of 1 per cent of the original contents of the fields.

Georgia.—The coal fields of Georgia are limited to a small area in the northwestern part of the State, estimated to cover 167 square miles and to have contained, when mining began, 933,000,000 short tons. The census report for 1860 contains the first authentic statement of production in Georgia, and the output in that year is placed at 1,900 short tons. The production of the State in 1907 was 362,401 tons, and the total production to the close of the year was 8,123,696 short tons, representing an exhaustion of 12,000,000 tons. This would still leave in the ground a total of 921,000,000 tons, of which 650,000,000 tons would probably be considered as the available supply, and this, at the rate of production in 1907, would last approximately 1,800 years.

Idaho.—The areas in Idaho known to contain workable coal are placed at 200 square miles, while there are 1,200 square miles which are not known, but which may also contain workable coal. The estimated original contents of the coal field of Idaho are placed at 600,000,000 tons, from which to the close of 1907 less than 25,000 tons had been mixed.

Illinois.—Illinois is the second State in coal-producing importance. The area in Illinois known to contain coal is larger than that of any other State east of the Mississippi River, and if we consider only the known coal areas the coal fields of Illinois cover a wider area than those of any other coal-producing State. The coal-producing area of Illinois is estimated at 35,600 square miles, and the original contents of the fields are placed at 240,000,000,000 short tons. The earliest mention of coal in the United States is contained in the journal of Father Hennepin, a French missionary, who, as early as 1679, reported a "cole mine" on the Illinois River, near the present city of Ottawa. The earliest record of actual mining is that coal was produced in Jackson County in 1810. In 1833 the production is reported to have been 6,000 short tons. In 1907 it was 51,317,146 short tons. The total production to the close of 1907 amounted to 645,868,309 tons, representing an exhaustion of 968,000,000 short tons, from which it appears that the exhaustion to the close of 1907 has been 0.4 of 1 per cent of the total estimated supply. The quantity of coal remaining in the ground at the close of 1907 was 4,664 times the production of that year, or about 2,500 times the exhaustion represented by that production.

Indiana.—The coal fields of Indian lie entirely in the southwestern portion of the State. They are confined within an estimated area of 6,500 square miles, and contained, when mining first begun, 44,169,000,000 tons of coal. Coal mining in Indiana began sometime between 1830 and 1840, and the census of the latter year reported a production of 9,682 tons. In 1907 the production amounted to 13,985,713 short tons, and the total production to the close of that year amounted to 159,440,390 short tons. The exhaustion to the close of 1907 had been 239,000,000 short tons, or 0.54 of 1 per cent of the original supply. Upon these estimates the quantity of coal remaining in the ground in Indiana at the close of 1907 was about 3,000 times the production of that year, and 2,000 times the exhaustion represented by that production.

Iowa.—The coal fields of Iowa are estimated to contain workable coal aggregating 12,560 square miles. To this may be added 5,640 square miles of possible workable coal areas. The original contents of the fields are estimated to have been 29,160,000,000 short tons. From this there has been produced from 1840, when mining first began, to the close of 1907, a total of 141,608,792 short tons, representing an exhaustion of 212,000,000 short tons. The quantity of coal still available at the close of 1907 was 28,948,000,000 short tons. At the rate of production in 1907, in estimating half a ton lost for every ton mined, this supply would last 2,550 years.

Kansas.—The areas in Kansas known to contain workable coal are placed at 3,100 square miles, although in addition to this there are 15,780 square miles which may contain workable coal. The estimated supply, when mining first began, is placed at 7,022,000,000 short tons. From this there has been produced from 1869 (the year of earliest production) to the close of 1907 a total of 91,176,204 short tons. This represents an exhaustion, including loss in mining, of about 136,000,000 short tons, from which it would appear that about 1.9 per cent of the original supply has been exhausted. The production in 1907 was 7,322,440 short tons, equivalent to an exhaustion of 10,000,000 short tons, which would indicate, at the rate of production in 1907, that the known coal supply of Kansas would last approximately 700 years.

Kentucky.—Kentucky is the only one of the coal-producing States which has within its borders areas belonging to two of the great coal fields. The eastern counties of the State are underlain by the coal beds of the great Appalachian system, while the southern limits of the central or eastern interior field are found in the more northern counties of the western part of the State. The eastern areas contain 10,270 square miles, the contents of which, when mining began, are 6,400 square miles, the contents of which, when mining began, are estimated at 67,787,000,000

short tons. The western areas contain 6,400 square miles, the original contents of which are placed at 36,240,000,000 short tons. The total estimated original supply of the State was therefore 104,027,000,000 short tons. Mining began early in the second quarter of the nineteenth century, and it is estimated that from 1829 to 1835 the production ranged from 2,000 to 6,000 tons a year. The production in 1907 was 10,753,124 short tons, and the total production to the close of the year was 122,404,574 short tons, which represents an exhaustion of 184,000,000 short tons, or 0.18 of 1 per cent of the original supply. The quantity of coal left in the ground at the close of 1907 would then be 103,844,000,000 tons, of which approximately 67,000,000,000 short tons would be considered available, or, in other words, the supply at the close of 1907 was 6,700 times the production in that year.

Maryland.—The coal fields of Maryland are confined to a limited area in Allegany and Garrett counties in the western part of the State. This area has an extent of 455 square miles and the original supply is estimated to have been 8,044,000,000 short tons. Mining began early in the nineteenth century, and shipments were made down the Potomac River in 1830. The first shipments by railroad were made in 1842, in which year 1,708 tons were shipped over the newly built Baltimore and Ohio Railroad. In 1907 the production amounted to 5,532,628 short tons, and the total production to the close of that year aggregated 147,606,548 short tons, equivalent to an exhaustion, including waste, of 221,000,000 tons, or not quite 3 per cent of the original supply. The supply still remaining at the close of 1907 was 7,823,000,000 short tons, 1,422 times the production and 948 times the exhaustion represented by the production of that year.

Michigan.—The coal fields of Michigan are the only ones within the drainage basin of the Great Lakes. They occupy an area of approximately 11,000 square miles and are estimated to have contained when mining first

began a total of 12,000,000,000 short tons of coal. Although coal mining has been carried on in Michigan for about seventy years, it is only a little more than a decade since it became of any importance as an industry, the production exceeding a million tons a year for the first time in 1901. The total production to the close of 1907 was 13,842,943 short tons, which, including waste, represents an exhaustion of 21,000,000 short tons, or 0.175 of 1 per cent of the total original supply. The production of Michigan in 1907 was 2,035,858 short tons. The supply remaining at the close of that year was, according to the best estimates, 11,979,400,000 short tons, of which 7,986,000,000 tons would be considered as available. This is equivalent to 3,900 times the production of 1907.

Missouri.—The original coal supply of Missouri is estimated to have been 40,000,000,000 short tons, included within an area of 23,000 square miles. The production of the State to the close of 1907 had amounted to 97,618,106 short tons, representing an exhaustion of approximately 146,000,000 tons, or 0.36 of 1 per cent of the original supply. The production in 1907 was 3,997,936 short tons, which is equivalent to an exhaustion of approximately 6,000,000 tons. The supply remaining at the close of 1907 is about 6,500 times the exhaustion created by the production in that year.

Montana.—Montana's scattered coal fields, known to contain workable coals, aggregate 34,067 square miles, while the areas which may contain workable coal, but which are not well known, amount to 17,575 square miles. The original contents of these coals fields are estimated to have been 303,060,000,000 short tons, from which there have been mined to the close of 1907 approximately 24,740,000 tons, representing an exhaustion of 37,000,000 tons, or 0.012 of 1 per cent of the original supply. The production in 1907 of a little over 2,000,000 tons is equivalent to an exhaustion of about 3,000,000 tons, and the coal left in the ground was 100,000 times that exhausted.

New Mexico.—The coal fields of New Mexico aggregate a total area of 18,335 square miles, and the original supply is estimated to have been 163,780,000,000 short tons, from which there had been produced to the close of 1907 a total of 22,325,432 short tons, representing an exhaustion of 33,000,000 tons, or 0.02 of 1 per cent of the original supply. The production in 1907 (2,628,959 short tons) is equal to nearly 12 per cent of the entire production of the coal to the close of that year, while the coal left in the ground is nearly 65,000 times the production in 1907, and over 40,000 times the exhaustion represented by that production.

North Carolina.—Two small areas of Triassic age contain all the coal known to exist in North Carolina. The total area is about 60 square miles, and the original contents of the field are estimated at 200,000,000 short tons. These areas have never been worked to any large extent, and the total production to the close of 1907 was less than half a million tons.

North Dakota.—Although the coal fields of North Dakota are of wide extent, the coal itself is all of lignitic character and of little commercial value at the present time. The total areas supposed to contain workable lignite are placed at 35,500 square miles and the original contents have been estimated at 500,000,000,000 short tons. The production, particularly considering the large supply, has been very small, the total exhaustion to the close of 1907 having amounted to only 4,000,000 tons.

Ohio.—Compared with the supply of coal originally contained within the coal fields of Ohio, the rate of exhaustion has been greater than that of any other State in the Appalachian system, with the exception of Maryland. The estimated original supply contained within an area of 12,660 square miles was 86,028,000,000 short tons. The first record we have of the production in the State is in the year 1838, when 119,952 short tons of coal were mined. Ohio's output was at that time exceeded

only by the production of Pennsylvania anthracite and bituminous coal from the Richmond basin. From 1845 to 1875 Ohio ranked second among the coal-producing States. In 1876 it was surpassed by Illinois, and since 1896, when it was surpassed by West Virginia, it has ranked fourth among the coal-producing States. In 1907 Ohio contributed 32,142,419 short tons of coal to the total product of that year. The total output of Ohio mines from 1838 to the close of 1907, a period of seventy years, has amounted to 492,769,358 short tons, representing an exhaustion of 739,000,000 tons, or something less than 0.9 of 1 per cent of the estimated original supply. The production of 1907, which was a little less than 7 per cent of the production to the close of that year, was equivalent to an exhaustion of about 48,000,000 tons. Deducting from the original supply the exhaustion at the close of 1907, there would still be available on January 1, 1908, 85,980,000,000 tons, or nearly 2,000 times the production in 1907.

Oklahoma.—All of the coal in Oklahoma is contained in that portion of the State which was formerly known as the Creek, Cherokee, and Choctaw nations of Indian Territory. The total area underlain by workable coal is estimated to be about 10,000 square miles, and the original contents are estimated to have been 79,278,000,000 tons. Mining did not begin in Indian Territory until comparatively late, the first production reported having been in 1880, when 120,947 short tons were produced. The industry has progressed rapidly, however, and the production in 1907 amounted to 3,642,658 short tons. The total production to the close of 1907 was 39,845,015 short tons, representing an exhaustion of approximately 60,000,000 tons. The quantity of coal left in the ground in Oklahoma at the close of 1907 was 13,000 times the exhaustion represented by the production in that year.

Oregon.—As far as known the earliest record of coal production in Oregon was in 1880, when the output

amounted to 43,205 short tons. In 1907 Oregon's production was 70,981 short tons, and the aggregate production from 1890 to the close of 1907 was 1,790,392 tons, which represents an exhaustion of 2,700,000 tons. The total area in the State containing workable coals is estimated at 230 square miles and the original supply at 1,000,000,000 short tons.

Pennsylvania.—The supplies of anthracite coal in Pennsylvania are discussed elsewhere in this paper. (See p. 13.) The bituminous areas in the western portion of the State are estimated to have an extent of 14,200 square miles and to have contained, when mining first began, 121,574,000,000 short tons. The development of the Pennsylvania bituminous coal fields did not begin until about twenty years after anthracite mining was established as an industry, the first production having been reported in the census year 1840, when 464,826 short tons were mined. Up to 1897 the production of anthracite coal in Pennsylvania exceeded that of bituminous, but in 1898 the bituminous production took the lead and has contained to lead since that date. In 1907 the production of bituminous coal exceeded that of anthracite by nearly 80 per cent, and as indicative of the extent to which the bituminous coal-mining industry of Pennsylvania has grown it may be stated that the production in 1907 was nearly three times that of 1897, only ten years before. The total production of bituminous coal in Pennsylvania to the close of 1907 was 1,846,069,253 short tons, which was equivalent to an exhaustion of 2,760,000,000 tons, or 2.5 per cent of the original supply. The exhaustion represented by the production in 1907 was 225,000,000 tons. The supply remaining at the close of 1907 was 109,804,000,000 tons, or 492 times the exhaustion represented by the production of that year.

South Dakota.—The northwest corner of South Dakota contains the southern extension of the North Dakota lignite beds, and it is estimated that about 6,000 square

miles of this territory may contain workable lignites. The contents are estimated at 10,000,000,000 short tons, and these are practically untouched.

Tennessee.—The coal fields of Tennessee are contained in a narrow strip in the eastern counties of the State, where the Appalachian province crosses the State in a northeast-southwest direction. Mining began sometime between 1830 and 1840, and the census for the latter year reported a production of 558 tons. Coal mining did not, however, develop into an important industry in Tennessee until after the close of the civil war, and it was not until 1883 that the production reached as much as 1,000,000 tons annually. Since that time it has increased with notable regularity, until in 1907 the production amounted to 6,810,243 short tons. The total area of bituminous coal in the State is estimated at 4,400 square miles, and the total original supply at 25,665,000,000 tons. The total production to the close of 1907 amounted to 84,304,601 short tons, representing an exhaustion of approximately 126,000,000 tons, or about 0.5 of 1 per cent of the original supply. The exhaustion represented by the production in 1907 was approximately 10,200,000 tons, and the supply left in the ground at the close of the year was equal to 2,500 times this exhaustion.

Texas.—The known bituminous coal fields of Texas are estimated to contain 8,200 square miles, and the exploited lignite fields 2,000 square miles. In addition to this there are 5,300 square miles which may contain workable bituminous coal and 53,000 square miles which may contain workable lignite. The estimated contents of the bituminous coal fields when mining first began in Texas were 8,000,000,000 short tons, and of the lignite fields 23,000,000,000 short tons. The exploitation of both the lignite and the bituminous areas is of comparatively recent date, no production having been reported from Texas prior to 1884, and it was not until 1901 that the output reached as much as 1,000,000 tons. The production to

the close of 1907 was 14,444,948 short tons, representing an exhaustion of 22,000,000 tons, or 0.07 of 1 per cent of the original supply.

Utah.—Utah's coal fields are contained in scattered areas aggregating 15,130 square miles. The quality of the coals ranges from subbituminous to anthracite. The estimated original supply was 196,458,000,000 short tons, from which the exhaustion, including waste, at the close of 1907, was 28,000,000 short tons, indicating that there were still remaning in the ground 196,430,000,000 tons, or a little more than 100,000 times the production of 1907.

Virginia.—The Richmond basin in Virginia, where coal mining in the United States was first carried on, contains 150 square miles. Another small area in Montgomery County contains 200 square miles of coal-productive territory, but the principal regions are in the southwestern corner of the State, which is crossed by the Appalachian system. The portion of the Appalachian coal field in Virginia is estimated to be 1,550 square miles. The original supply has been placed at 22,500,000,000 short tons. From this there has been produced at the close of 1907 a total of 67,229,152 short tons, representing an exhaustion of 36,000,000 tons. The production in 1907 was 4,710,895 short tons, equivalent to an exhaustion of a little over 7,000,000 tons, so that the coal left in the ground in Virginia at the close of 1907 was 2,000 times the exhaustion represented by the production of that year.

Washington.—Washington's coal supply is contained within a number of areas that are scattered over the State and aggregate approximately 1,100 square miles. The estimated original supply was 20,000,000,000 short tons, and while mining began there as early as 1860, the total production to the close of 1907 was only 43,108,697

short tons, of which nearly 50 per cent was produced within the last seven years. The exhaustion represented by the production to the close of 1907 was 64,000,000 short tons, which is equivalent to about one-third of 1 per cent of the original supply. The quantity of coal still in the ground at the close of 1907 was estimated to be 19,936,000,000 short tons, equivalent to 5,400 times the production of 1907 and 3,600 times the exhaustion made by that output.

West Virginia.—The total area containing workable coal in Virginia is 17,000 square miles, and the original supply when mining first began was 231,039,000,000 tons. West Virginia was not admitted as a State until 1863, in which year the production amounted to 444,648 short tons. The quantity of coal mined prior to that time, in the portion of Virginia which afterwards became West Virginia, was not sufficient to materially affect the total output. For a number of years West Virginia has been third among the coal-producing States, and in 1907 the production amounted to a little over 48,000,000 tons. The aggregate production to the close of 1907 was 434,198,539 short tons, equivalent to an exhaustion of 650,000,000 tons. At the beginning of 1908 there still remained available in the coal fields of West Virginia 230,389,000,000 short tons, nearly 4,800 times the production in 1907, or 3,200 times the exhaustion represented by the 1907 output.

Wyoming.—The estimated original coal supply of Wyoming is larger than that credited to any other coal-producing State, with the exception of North Dakota. In the latter State, however, the entire supply is lignite, while in Wyoming the coals are of subbituminous or of bituminous character. The total area which may contain workable coals has been estimated 50,793 square miles, and the contents of this field, when mining first began, at

[Chart Omitted]

424,085,000,000 short tons. In comparison the aggregate production at the close of 1907, which was 77,818,765 short tons, appears insignificant. The total exhaustion of the beds to the close of 1907 amounted to 116,000,000 short tons, or 0.027 of 1 per cent of the total estimated supply.

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

BULLETIN 424

THE VALUATION OF PUBLIC COAL LANDS

THE VALUE OF COAL LAND

by

GEORGE H. ASHLEY

DEPTH AND MINIMUM THICKNESS OF BEDS AS LIMITING FACTORS IN VALUATION

by

CASSIUS A. FISHER

WASHINGTON
GOVERNMENT PRINTING OFFICE
1910

STANDARDS ADOPTED FOR COAL LANDS OF THE PUBLIC DOMAIN

In the classification of the coal lands remaining on the public domain the Director of the United States Geological Survey, with the approval of the Secretary of the Interior, has fixed 3,000 feet as the limit of depth of practical coal mining and 14 inches as the minimum thickness of a bed of coal which may be regarded as of workable dimension. The limit of depth chosen exceeds by only 800 feet the deepest coal beds which are actually being worked in this country and falls about 900 feet short of the depth at which coals are being successfully exploited in Belgium. It was clearly recognized in fixing this depth limit that 4,000 feet should be the limit consistent with present practice and experience in coal mining abroad. As the coals of the public lands, however, are in general of a medium grade and are located in the West, where their exploitation has only well begun, the time when coals on these lands lying between 3,000 and 4,000 feet below the surface would be worked is still remote. It was recognized that, under the present law, which does not permit the separation of surface and underground rights, the reservation of lands underlain by coals at these depths for mineral use only would prohibit the development of the surface features of such lands, which are of greater immediate value. The question became simply, For what use is the land most valuable? There was no doubt in the minds of those who fixed the depth limit of practical coal mining on the public domain at 3,000 feet that if the problem were considered in its broader aspect—that is, with a view to the future, in an endeavor to make the wisest disposition of the country's coal—the depth limit might properly be placed even at 4,000 feet.

In attempting to establish the minimum workable thickness of a coal bed it was hardly necessary, although very instructive, to look abroad for examples of thin-bed mining, for in parts of the Interior coal province of this country very thin coals are now worked. A minimum thickness of 14 inches does not seem extreme in any sense, as coal beds of this thickness are actually being worked by small mines in more than one locality in the Interior province and beds 2 to 4 inches thicker are being worked in several places by shipping mines of moderate size. This position is strengthened by the facts that in England and on the Continent coals considerably less than 14 inches thick are now being worked independently, and that for the last forty years, or since 1871, when the report of the first royal commission on coal supplies was made, 12 inches has been regarded in England as the minimum thickness of a workable coal bed.

The United States probably has greater coal resources than any other country and, as compared with England, has consumed a relatively small proportion of those resources; but these facts do not justify the practice of disregarding coals as of no value which, by reason of their great depth or their occurrence in thin beds, are difficult to mine. Surely in the United States, which ranks first in the world's production, it would be possible to win coal under as great difficulties as in any other country.

Of course it is to be expected that the question of mining coals at great depth and in thin beds in a commercial way will be regarded by the practical coal-mining man of to-day as more or less speculative. This criticism may be justifiable in a measure if the subject is viewed only in the light afforded by present commercial practices; but if it is considered with the broader view which notes the marked changes in conditions that are already manifesting themselves—such as the progress in obtaining greater heat values from coals, the greater specialization of their uses, and the certain exhaustion of thicker, shallower, and more valuable beds—it is certainly reasonable to expect that deep and thin coals will some day be mined in this country in a commercial way, as they are at the present time in other countries, where the main difference in conditions is that coal exploitation has reached a more mature stage.

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Technical Paper 2

DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

JOSEPH A. HOLMES, Director

THE ESCAPE OF GAS FROM COAL

by

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WASHINGTON
GOVERNMENT PRINTING OFFICE
1911

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THE ESCAPE OF GAS FROM COAL.

By HORACE C. PORTER and F. K. OVITZ.

GENERAL STATEMENT.

It is a matter of common knowledge that inflammable gas made up chiefly of methane, which forms with air the so-called fire damp of the miner, escapes from the coal in many mines; yet little is known as to the condition of this gas in the coal, its quantity and rate of escape. In addition to the gas set free by the coal itself, there is in many mines a large amount of inflammable gas that comes from reservoirs in the rock strata above or below the coal bed and enters the mine through cracks in the roof or floor. Gas entering the mine in such manner from extraneous sources is not considered in the following report, which presents rather some results of a laboratory investigation of the rate of escape of gas from several coals while kept in bottles connected to gas-collecting reservoirs. This investigation was begun by the United States Geological Survey and is being continued by the Bureau of Mines at the mining experiment station at Pittsburg, Pa.

SIGNIFICANCE OF RESULTS.

The results of the investigation show that gas escapes from coal not only during the breaking down of the coal in the mines, but also continuously for a long time after the coal is mined. The volume from some coals is so great as to merit serious consideration in connection with the ventilating of the mines and the choice of methods of breaking down the coal. For example, during the first two weeks after mining, there was set free by one coal, exclusive of the gas that escaped during mining, a volume of methane equal to three-fourths of the volume

of the coal itself.[a] Probably each cubic foot of this coal (in the seam) set free in all during its mining and during the first two weeks thereafter a cubic foot of methane. It was shown by further test that during the first five months after mining there was set free from this coal a volume of methane equal to one and three-fourths times the volume of the coal.

Many investigators, Chamberlin,[a] among others, have shown that methane accumulates along lines of fracture, such as joint cracks, within places of increased porosity in the coal bed and escapes from these as they are cut in mining. In any locality of the mine where for any reason adequate ventilation is not maintained, the methane which has thus escaped may become a source of danger from explosion.

CONDITION OF THE GAS IN COAL.

In some cases the volume of gas liberated from broken coal is greater than the volume of the coal itself—that is, of the actual solid and the cellular space combined. Several theories have been proposed to account for this fact. If the inclosed gas is mechanically imprisoned in the microscopic pores of the coal, it must be under a pressure greater than that of the atmosphere; otherwise it would occupy after its escape a volume less than that of the coal. It is possible, furthermore, that there is a continual slow formation of methane by chemical decomposition of the coal, or it may be that the gas is held in a state of occlusion—that is, either dissolved molecularly or adsorbed upon the inner surfaces of the cellular spaces.

The gas which escapes from coal has been very often called "occluded gas," but, as Chamberlin has made plain,[b]

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[a] See footnote, p. 10, for explanation of volume relations.

[a] Chamberlin, R. T., Notes on explosive mine gases and dusts with special reference to the explosions in Monongah, Darr and Naomi, Coal Mines, U.S. Geol. Survey Bull. 383, 1909, p. 32.

[b] Op. cit., pp. 16-17.

the word "occluded" has been loosely used in this connection, and the radical difference between mechanical imprisonment and true occlusion or condensation has been generally overlooked. The word "occlusion" properly implies the condensation of a gas within a solid substance to a state approaching that of liquid or solid, either condensed upon the interior surfaces of the pores or dissolved molecularly in the solid. The Century Dictionary defines occlusion as the absorption of a gas by a metal, as of hydrogen by palladium, in which case the hydrogen is regarded as existing in a solid form as a quasi metal. Mendelooff [c] states, "The capacity of certain dense metals for the absorption of hydrogen * * * is termed occlusion and presents a similar phenomenon to solution; it is based on the capacity of metals of forming unstable, easily dissociating compounds with hydrogen similar to those which salts form with water."

The results presented in this paper do not determine the condition of the gas in coal. The fact that the gas escapes without the aid of heat or of reduced pressure is hardly in strict agreement with the accepted idea of occlusion. But, on the other hand, Chamberlin [d] found that during the crushing of coal to 30-mesh size under a high vacuum there was liberated only about one-quarter of the total volume of methane obtained from the same coal while bottled for six months in vacuo. This fact is with difficulty explained by the theory of mechanical imprisonment under pressure, for it seems likely that in such case the walls confining the gas would be broken by the large excess of pressure within, and that the bulk of the gas would escape immediately. The theory that methane continues to be formed by slow decomposition of the coal explains satisfactorily many of the phenomena observed,

[c] Mendeloff, D. I. Principles of Chemistry, English Translation of 6th Edition, vol. 1, p. 143.

[d] Op cit. pp. 34-36.

but does not easily account for the decrease in the rate of escape of the methane.

Whatever may be the condition of the gas and its manner of liberation, the results presented in this paper clearly establish the fact that methane continues to escape from coal in considerable quantities and for a long period under atmospheric conditions of temperature and pressure. If allowed to accumulate, this slowly escaping methane in mines may become a source of danger even greater than the methane liberated in breaking down the coal. Calculations based on these results show further that contrary to common opinion the loss of heat value due to loss of methane in exposed piles of coal is probably in all cases so small as to be almost inconsiderable.

PREVIOUS INVESTIGATIONS.

Parr and Wheeler [a] have noted the accumulation of combustible gas from Illinois coals in laboratory sample bottles kept sealed for a year. They attribute to this fact part of the loss of heat value which they found in these samples. Many investigations have been made of the so-called occluded gas in coal, notably by Bedson,[b] McConnel,[c] Trobridge,[d] Parr and Barker,[e] and Chamberlin.[f] With the exception of Chamberlin these investigators have confined their attention to the gases drawn from coal by a reduction of pressure during a comparatively brief space of time. Their findings as to the quantity and the composition of the gases vary widely. The discrepancies are probably due not only to differences in the character of the coals, but also to the fact that most of the investigators

[a] Illinois State Geol. Survey Bull. No. 8, 1997, p. 106.

[b] Chem. News, vol. 68, 1883. p. 187.

[c] Jour. Soc. Chem. Ind., vol. 13, 1994, p. 36.

[d] Jour. Soc. Chem. Ind., Vol. 26, 1906, p. 1129.

[e] University of Illinois Eng. Exp. Sta. Bus. 33, 1909, pp. 10-28.

[f] Op. cit. pp. 16-39.

have taken little account of the gas that escaped in the interval between mining and testing. Parr and Barker took account of this factor by collecting 200-gram samples in flasks sealed in the mine and extracting the gases under vacuum on reaching the laboratory. They obtained in this manner from one Illinois coal 40 to 80 c.c. of methane and about 10 c.c. of carbon dioxide per 100 grams of coal, and showed also the rapid absorption of oxygen by fresh coal. Their experiments, however, did not take account of the gas liberated in breaking down the coal, nor did they study the escape of gas into an open space through an extended period of time. Chamberlin,[a] on the other hand, went further and not only extracted the loosely held gas of coal by crushing small lumps in a vacuum, but collected also considerable additional quantities of gas by keeping the crushed coal in a vacuum for six months. By crushing in vacuo to 10-mesh size coal from Monongah, W. Va., he obtained a volume of methane amounting, in different experiments, to 0.1 to 0.4 times the volume of the coal, and by keeping the crushed coal six months in vacuo he obtained an additional volume of methane 0.8 to 1.4 times the volume of the coal. The gas liberated in mining and during the deposit of the coal in covered cans to the laboratory was disregarded. Other gases extracted in Chamberlin's experiments were carbon dioxide (less than one-tenth of the volume of methane), and very small quantities of carbon monoxide and unsaturated hydrocarbons.

SUMMARY AND INTERPRETATION OF RESULTS

The experiments described in this paper supplement Chamberlin's work, and bring out the additional facts that methane and small quantities of carbon dioxide escape from coal for an extended period under atmospheric pressure, the amount of the gas and its rate of escape being nearly the same as when the coal is kept in a vacuum.

[a] U.S. Geol. Survey Bull. 383, pp. 17-39.

Furthermore, the experiments show that oxygen is absorbed rapidly by fresh coal and in quantities which are far out of proportion to the carbon dioxide liberated, if the latter be assumed to arise from combustion of the coal. The tabular statements and graphs on succeeding pages show the rate at which methane is liberated from several different coals.

Unfortunately, the results do not permit even an approximate estimate of the rate at which the different coals absorb oxygen. It is found late in the course of the experiments that the concentration of the oxygen available for action on the coal had much influence on the rapidity of the action, and this concentration had varied decidedly in the different tests. Ordinary air was used in some of the tests and oxygen, 95 per cent pure, in others. In all the experiments there is clearly shown, however, a rapid and long-continued absorption of oxygen, with little or no accompanying formation of carbon dioxide. Later experiments, now in progress in the laboratory in the Bureau of Mines, show that coals vary widely in the rapidity with which they absorb oxygen under like conditions.

The rapid absorption of oxygen by fresh coal without the formation of carbon dioxide is well illustrated by the coal from Connellsville, Pa. (No. 41, Table 2, p. 10.) Ten kilograms (22 pounds) of this coal absorbed during the first day after mining nearly half the oxygen in the 10 liters of air in the bottle and gave off little more than one-tenth as much carbon dioxide as would have been formed if all of the oxygen absorbed had combined with carbon to produce carbon dioxide.

The air of a closed mine, or of a poorly ventilated section of any coal mine, is usually deficient in oxygen, as compared with normal air, and contains much less carbon dioxide than will account for this deficiency on the basis

of the reaction of carbon and oxygen to form carbon dioxide.

This phenomenon is probably a direct result of the chemical addition of oxygen to the coal, since it is not likely that oxygen could be consumed in any other way without forming carbon dioxide, unless there were a fire in the mine, in which case oxygen would combine with hydrogen as well as with carbon. The oxygen absorbed from air by coal probably does not form directly either carbon dioxide or water, but is merely added, as suggested by Boudouard [a] and others, to certain compounds in the coal that are unsaturated with respect to oxygen and thereby produces humic acid or related substances.

The results presented show large variations in the quantities of methane liberated by the coals tested. A Kentucky cannel yielded only a trace of methane in nine months, while the Harrisburg, Ill., coal gave off one-fourth of its volume in four days, and the Monongah, W. Va., coal one-third of its volume in the same time.

These results are by no means to be interpreted as showing that some coals which yield little or no gas after mining are therefore not accompanied by gas in the mines. Pocahontas coal, for example, yields little methane after mining, but the mines in the western part of what is known as the Pocahontas district contain at times large quantities of gas. The methane which accumulates in coal mines may come, as before mentioned, from two sources—(1) from reservoirs of gas under pressure in the rock strata, and (2) from the coal bed itself, either from cavities where the gas has accumulated, or from a state of condensation or compression in the microscopic pores of the coal. The investigation discussed in this paper has to do only with the latter source, and although it advances data which emphasize the importance of the coal seam itself as a source of gas, it in no sense overlooks or lessens the importance of the inflow of gas from outside reservoirs.

[a] Bull. Soc. Chem., sec. 4, vol. 8, p. 390.

It is known that variations in atmospheric pressure have an influence on the accumulation of methane in mines. Apparently incompatible with this fact are the results presented in this paper, which show that methane escapes from broken coal at a rate practically unaffected by large reduction in pressure. Atmospheric conditions, however, may easily affect the escape of gas from the bed of coal in situ, since a slight fall in barometric pressure may open communication with cavities or crevices in the coal bed where gas is imprisoned under pressure, although the same decrease of pressure may have little or no effect on the gas that is more intimately imprisoned in the pores of the solid coal.

Carbon dioxide was found in the gases evolved by all the coals that are tested. The amount varied decidedly for the different coals; a maximum, from the Sheridan, Wyo., coal (No. 43), was 0.36 volumes in seven months. (See Tables 1 and 2, p. 10.)

PROCEDURE IN EXPERIMENTS.

A sample of approximately 10 kilograms (22 pounds) of the coal was taken from a clean, fresh face of the coal seam in the manner prescribed by the Bureau of Mines for mine sampling.[a] This sample was crushed so as to pass a ½-inch screen, and placed in a 5-gallon crated glass bottle, which was then stoppered as quickly as possible—usually within 50 to 80 minutes after beginning the cut. A tight-fitting rubber stopper was wired in. Through the stopper passed a 20-cm. (8-inch) length of glass tubing of 2-mm. (1/12-inch) bore, its outer end sealed by a piece of heavy rubber tubing and a solid glass plug. The crushed coal consisted largely of small lumps between one-tenth and one-half inch size but contained 10 to 20

[a] Bureau of Mines Technical Paper 1, The sampling of coal in the mine, by J.A. Holmes. 1911. 18 pp.

per cent of material under one-tenth inch in size. The bottle was shipped forthwith to the laboratory at Pittsburg. As soon as it arrived there the rubber stopper and connections were painted with shellac to avoid all risk of leakage, and a gas sample was at once withdrawn for analysis. The bottles were then allowed to stand in the laboratory several months at a temperature varying from 12° to 32°C.

Four coals, No. 37 (Pocahontas, Va.) No. 39 (Harrisburg, Ill.), No. 43 (Sheridan, Wyo.), and No. 49 (Benton, Ill.), were subjected to further investigation, as follows:

The bottle of Pocahontas coal (No. 37) was connected through the glass tube in the stopper to a reservoir of oxygen, so that the oxygen flowed into the bottle as fast as it was absorbed by the coal. From time to time the gas that accumulated in the bottle was drawn out in order to relieve the pressure and permit the inflow of oxygen. The bottles containing coals No. 39 and No. 43 were connected to a supply of air instead of oxygen and the inlet tube extended to the center of the coal in each bottle. There also was attached to each of these two bottles a collecting reservoir for the escaping gas, the connecting tube for this purpose passing from the top of the bottle to the reservoir. The bottle of Benton, Ill., coal (No. 49) was connected with both an oxygen supply and a gas-collecting reservoir, but oxygen, not air, was admitted to the bottle and was admitted at the top, the gas being withdrawn from underneath the coal.

The air, or oxygen, admitted was measured, and the gas withdrawn was measured and analyzed. Air, or oxygen, was admitted in slight excess so that every gas sample withdrawn contained some oxygen. It is hardly fair to compare the results of the test on Pocahontas coal with the results of the other tests, since in this test the accumulated gas was not withdrawn as regularly nor as rapidly

as in the others and the pressure within the bottle may have retarded the escape of methane from the coal. The test, however, serves to show that this coal evolves a comparatively small quantity of methane. A number of other coals were tested in somewhat similar manner, occasional samples of gas being taken from the bottle but without drawing off the accumulated gas into collecting reservoirs or admitting a supply of oxygen. The tests made in this manner are named in Table 2.

The gas samples were analyzed by the Hempel methods with certain modifications, as described in Bureau of Mines Bulletin 1, pages 22 to 24. Methane was determined always by the slow combustion method of Winkler. No attempt was made to determine less than 0.2 per cent of carbon monoxide, and since the first samples from the bottles showed less than that quantity of carbon monoxide and also of hydrogen and unsaturated hydrocarbons, no determinations of these three constituents were made thereafter.

Descriptive list of coals tested.

[Table Omitted]

TABLE 1.—*Gases given off and oxygen absorbed by four coals.*

[Table 1 Omitted]

TABLE 2.—*Gases given off and oxygen absorbed by five coals.*

[Table 2 Omitted]

[Figure 1 Omitted]

The difference in the rate of escape of methane from the coals is shown graphically in figure 1.

The results given in the tables and shown in figure 1 emphasize the gradual decrease in the rate of escape of methane and, in some cases, the ending of the liberation of methane within five months. The escape of methane from the two southern Illinois coals appeared to continue for a longer time, but even these coals showed a well-marked tendency to stop giving off gas. The dotted portions of the curves in figure 1 indicate the probable liberation of methane after the last measurement. The experiments with the coals from Monongah, W. Va., Hanna, Wyo., and Connellsville, Pa., were not carried far enough to show the rate of continuous escape of methane, but show the large quantity of methane set free by these coals just after mining. The coals from Rock Springs and Sheridan, Wyo., Paintsville, Ky., and Pocahontas, Va., do not appear to contain much inclosed gas. The results from the Harrisburg, Ill., coal (No. 39) are particularly instructive in showing, under conditions permitting good circulation of air, the gradually diminishing escape of methane, the long-continued absorption of oxygen, and in particular a steadily increasing liberation of carbon dioxide. This last phenomenon has been noted by Chamberlin,[a] and seems to indicate that either carbon dioxide is more tenaciously held in coal or, because of its greater density, does not diffuse as readily as methane. It is of interest to note in this connection the results from the Rock Springs and Sheridan, Wyo., coals and the Kentucky cannel coal, all of which yielded at the start greater quantities of carbon dioxide than the coals that were more highly charged with methane.

In a few instances, during the analysis of the hydrocarbons in the gases, a small proportion of ethane was indicated by the presence after combustion of slightly more carbon dioxide than accorded with the contraction in volume. But the quantities were so slight as to be within the probable limits of experimental error.

[a] U.S. Geol. Survey Bull. 383 p. 30.

The rapidity with which the coals absorbed oxygen may be seen from the data on coals 43 (Sheridan, Wyo.) and 49 (Benton, Ill.) in table 1, which show that in less than 15 days these coals had exhausted the oxygen from a volume of air equal to their own volume. In neither of these instances was the volume of carbon dioxide formed during the process greater than one-tenth of the volume of oxygen absorbed. That oxygen is probably taken into chemical combination rather than occluded or adsorbed by coal was shown by a simple experiment with the Benton, Ill., coal (No. 49). After being supplied with oxygen for five months, during which time it combined with oxygen equal in volume to nearly seven times its own volume of oxygen, a sample of the coal was placed in boiling water in a flask. The gases evolved during 15 minutes' boiling showed no excess of oxygen over that contained in air.

LOSS OF HEATING VALUE.

The largest volume of combustible gas evolved was from the sample of Benton, Ill., coal. From 12.2 kilograms of this coal, 16.9 liters of methane were evolved in one year and five months. If a calorific value for methane of 9,400 small calories per liter is assumed, there were lost by the 12.2 kilograms of coal $9,400 \times 16.9 = 158,860$ calories. As the heating value of the coal was about 7,500 calories, the percentage of loss was approximately $\frac{158,860}{12,200 \times 7,500} = 0.16$ per cent. It is evident, therefore, that no considerable loss of heating value can be attributed directly to the escape of combustible gases from coal during storage at ordinary temperature.

CONCLUSIONS.

The results of the experiments discussed in this paper show that certain American coals, whose mining is attended with danger from accumulations of inflammable

gas, liberate this gas not only while they are being broken down in mining, but also during a long period thereafter. At first the gas escapes rapidly, but the rate diminishes and tends toward a final cessation in 3 to 18 months. If the volume of the small lumps of coal used in the experiments be taken as the unit of measurement, about one-fourth volume of methane escapes during the crushing of the coal, as shown by Chamberlin, and one-half to one and one-half volumes on continued exposure to the air, as shown by the authors. The loss of fuel value by this loss of gas is small, but the danger of accumulation of explosive gas from this source in mines and in coal bunkers is sufficient to justify its being taken into account in the ventilation of mines and in the storage of coal.

PUBLICATIONS ON FUEL TESTING.

The following publications can be obtained free of cost by applying to the Director of the Bureau of Mines, Washington, D. C.:

BULLETIN 1. The volatile matter of coal, by H. C. Porter and F. K. Ovitz. 1910. 56 pp. 1 pl.

BULLETIN 2. North Dakota lignite as a fuel for power-plant boilers, by D. T. Randall and Henry Kreisinger. 1910. 42 pp., 1 pl.

BULLETIN 3. The coke industry of the United States as related to the foundry, by Richard Moldenke. 1910. 32 pp.

BULLETIN 4. Features of producer-gas power-plant development in Europe, by R. H. Fernald. 1910.

BULLETIN 5. Washing and coking tests of coal at the fuel-testing plant, Denver, Colo., July 1, 1908, to June 30, 1909, by A. W. Belden, G. R. Delameter, J. W. Groves, and K. M. Way. 1910. 62 pp.

BULLETIN 7. Essential factor in the formation of producer gas, by J. K. Clements, H. Adams, and C. H. Haskins. 1911.

BULLETIN 8. The flow of heat through furnace walls, by W. T. Ray and Henry Kreisinger. 1911.

BULLETIN 9. Recent development of the producer-gas plant in the United States, R. H. Fernald. 1909. 82 pp., 2 pls. Reprint of Bulletin 416.

BULLETIN 11. The purchase of coal by the Government under specifications, by H. Pope. 1911. 80 pp.

TECHNICAL PAPER 1. The sampling of coal in the mine, by Joseph A. Holmes. 1911. 18 p.p.

Technical Paper 9

DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
JOSEPH A. HOLMES DIRECTOR

THE STATUS OF THE GAS PRODUCER AND OF THE INTERNAL-COMBUSTION ENGINE IN THE UTILIZATION OF FUELS

BY

ROBERT HEYWOOD FERNALD

WASHINGTON
GOVERNMENT PRINTING OFFICE
1912

THE STATUS OF THE GAS PRODUCER AND OF THE INTERNAL-COMBUSTION ENGINE IN THE UTILIZATION OF FUELS.

By ROBERT HEYWOOD FERNALD.

INTRODUCTION

Investigations into the possibility of generating producer gas for power purposes in a commercial way from the various mineral fuels of the country have been carried on for some time by the United States Government. These investigations have been associated with steaming, briquetting, coking, and other tests, all of which supplemented an examination into the nature, extent and distribution of the fuels used. The tests have been made with carefully selected representative samples and carload lots of coal, lignite, etc. procured especially for the purpose by experienced collectors.

The investigations promise to yield a highly important result—the development of greater efficiency in the use of all fuels. This result is of especial importance for States remote from coal supplies.

In New England, for example, marked economies can be gained by a general use of the gas producer, and moreover these economies would be sufficient to overcome the handicap placed on industries there by the transportation charges on coal. The development of power in the New England States through the efficient method suggested by these investigations would mean a yearly saving of many millions of dollars.

Many States of the West that have no good coal are also greatly benefited by the investigations, which have shown the adaptability of the gas producer for the utiliza-

tion of low-grade coal, lignite, peat, etc. As mined, these fuels cannot be used in boiler furnaces and will not bear long transportation, but the gas producer makes them of potential value. Thus the gas producer is an agency of conservation. It helps to keep the low-grade coals from being permanently lost by being left in the mines in such condition as to make their future recovery impossible. In States in which deposits of low-grade coal, lignite, and peat are found, the present cost of power, as developed in steam plants with coal that has been shipped a considerable distance, can be materially reduced by placing producer plants at the mines or bogs, so as to utilize these low-grade fuels without cost of shipment by generating electric current which can be easily transmitted to desired points within a wide radius.

NATURE OF TESTS.

The tests that have been conducted at the Government fuel-testing plants are of two classes. (1) those made with the pressure-producer installation used at St. Louis, Mo., and Norfolk, Va., between October 1, 1904, and June 30, 1908, and (2) those made with the down-draft producer plant installed at the Bureau of Mines experiment station in Pittsburgh, Pa., between July 1, 1908, and June 30, 1910. The problems taken up at the Pittsburgh station involved new apparatus and a method of procedure totally different from that followed at St. Louis and Norfolk.

A somewhat detailed account of the producer-gas investigations of the Government from October 1, 1904, to June 30, 1910, is given in Bulletin 13[a] recently issued by the Bureau of Mines. The more important facts and conclusions presented in that bulletin by C.D. Smith and myself are summarized in this paper, which is issued mainly for distribution to persons who may not care for the more detailed technical statements contained in Bulletin 13.

* * * *

CHEMICAL ENGINEERING SERIES

Coal, Coke, and Coal Chemicals

BY

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FIRST EDITION

McGRAW-HILL BOOK COMPANY, INC.
NEW YORK TORONTO LONDON
1950

Volatile Matter. The volatile matter represents that portion of a coal which is converted into volatile products when the coal is heated in the absence of air. Because the proportion thus vaporized varies with temperature and time of heating, for comparative results the conditions of the test are standardized and are rigidly adhered to. A 1-g sample of the dry coal in a weighed, covered platinum crucible is heated for exactly 1 min at 950 + 20°C (1742 + 36°F). The loss in weight times 100 equals the percentage of volatile matter.

The concentration of volatile matter ranges from about 2 to 8 percent in anthracites, and up to over 40 percent in some American bituminous coals. It is a very important value to consumers of coal. High-volatile coals, for instance, tend to burn with a long flame and may give much smoke. In order to secure maximum thermal efficiency during combustion, the volatile matter must be completely burned; the coal, therefore, requires careful firing or is burned on grates designed for its combustion. Steam coals containing a relatively low volatile content, 15 to 25 percent, have often been preferred because they tend to give less smoke. Powdered coal for boiler firing is preferably high in volatile matter, although low-volatile coals have also been used satisfactorily in this form. The gases evolved from the powdered coal aid in rapid combustion. On account of the high yields of gas obtainable from high-volatile coals, they are preferred for the manufacture of coal gas. The importance of the volatile matter in byproduct coking is discussed in Chaps. 7 and 8.

Ash. The ash is determined by complete combustion in excess air of a weighed sample of the coal. From the weight of noncombustible residue the percentage of ash is calculated. Coals range in ash content from 2 to very high percentages. The following figures show the range in ash content of the coals from three important btiuminous fields in the United States:

	Percent by weight
Pennsylvania	5-12
Illinois, Indiana	7-17
Oklahoma	6-11

Coal ash is derived from clay, iron pyrites, limestone, sand, and other mineral matter, all in a more or less finely divided form distributed throughout the coal in the seam; clay, shale, or slate from the floor, the roof of the seam, or veins in the coal mass; and the inherent inorganic matter chemically combined with the organic matter of the coal. Although the ash in coals in the United States varies widely in chemical composition, it usually comes within typical percentage limits, as follows: [1]

* * * *

[1] W. A. Selvig and F. H. Gibson, *U.S. Bur. Mines, Tech. Paper* 679, 1945, 20 pp.

Established 1845

SCIENTIFIC
AMERICAN

March 1974 Volume 230 Number 3

The Gasification of Coal

This formerly widespread technology, which lost its markets to natural gas and petroleum, is now being reexamined. New methods promise an alternative source of fossil-fuel energy

by Harry Perry

Nearly every major city in the eastern U.S. once had its gashouse, where gas was manufactured (usually from coal) for lighting and cooking. The gashouses and the bulky cylindrical storage tanks that stood near them gradually disappeared after World War II as natural gas came to be distributed nationally by pipeline. Now, with both natural gas and petroleum increasingly in short supply, the idea of improving the nation's energy situation by the gasification of coal, which is plentiful, is attracting much interest.

Coal is found in 30 of the 50 states and represents more than 90 percent of the proved reserves of all developed fuels. At the 1972 rate of consumption the proved coal reserves would not be exhausted for some 600 years. Even if coal were the sole source of energy and the total demand for energy rose at the rate of 3.5 percent per year, the proved reserves would last for 47 years and total coal reserves for nearly 75 years.

Natural gas gained its ascendancy because its cost is low and its heating value is high. Like other gas it is clean, easy to distribute and convenient to use. In the years after World War II it therefore became the preferred residential and commercial fuel and also found many industrial applications. For these reasons the consumption of natural gas grew at a rate of 5.4 percent per year between 1947 and 1971, compared with a rate of 3.1 percent per year for the total energy consumption.

Gas made from coal could substitute for natural gas, although the old technology of coal gasification would have to be improved in order to give the product the heating value of natural gas (about 1,030 British thermal units per cubic foot). In addition the unenriched gas made from coal (with heating values of from 125 to 560 B.t.u. per cubic foot) would serve well in a number of industrial applications. It is therefore not surprising that the gasification of coal is being reexamined as a major source of clean energy from domestic resources.

Gas manufactured from coal was first produced in the late 18th century by heating coal in the absence of air. (It was heated by burning part of the coal outside a vessel containing the remainder of the coal; if the coal inside the vessel had been allowed to come in contact with air, it would have burned, forming combustion-product gases rather than gas that could itself be burned later.) The first coal-gas company, which distributed its product for lighting, was chartered in London in 1812; the first U.S. company was chartered in Baltimore in 1816.

In those days the gas was being produced by destructive distillation, that is, by heating the coal to a temperature where it decomposed chemically. The gas produced by the distillation of coal has a heating value of from 475 to 560 B.t.u. per cubic foot, depending on the type of coal and the temperature to which it is heated. A similar type of gas is produced when coal is carbonized to manufacture coke; frequently coke-oven gas supplemented coal gas when it was locally available and coal gas was in short supply.

In these processes 70 percent or more of the original coal remains as a solid residue, consisting mostly of carbon, that must be sold or otherwise utilized. With coke-

oven gas this is no problem, since coke is the major product. With coal the answer lies in going a step beyond distillation to gasification.

Gasification involves not only heating the coal, as in distillation, but also the subsequent reaction of the solid residue with air, oxygen, steam or various mixtures of them. The distillation step releases a certain amount of gas that has a fairly high B.t.u. content because methane (CH_4) and other higher hydrocarbons contained in the coal are among the first components to emerge as the coal decomposes. The gasification step produces a gas that is essentially a mixture of hydrocarbon and carbon monoxide (which has a much lower heating value than the distillation gases do) with some of the gases distilled from the coal. The amount of the distilled gas in the final product varies with the gasification process.

Oxygen is expensive, and so the old gas companies resorted to an alternative process to make a gas that supplemented coal gas and coke-oven gas. The process produced what was known as "blue gas" or "water gas." Anthracite coal from which the fine sizes had been removed, with the large sizes being crushed to an acceptable dimension, was fed to a vessel lined with a refractory material. After the gasifer had been brought up to a suitable temperature the coal (it could also be coke) was blasted with a stream of air and heated further by combustion with oxygen in the air. During the first part of this "blow" period the gas produced was mostly dioxide ($C + O_2 = CO_2$), but as the coal or coke in the upper level of the bed grew hotter the reverse reaction ($CO_2 + C = 2CO$) began to go, meaning that carbon monoxide was being produced in increasing amounts. After enough coal or coke had been heated sufficiently the valves controlling the flow of air were closed and other valves were opened to begin the "run" period, in which the hot coal or coke was reacted with steam ($C + H_2O = H_2 + CO$). It was a cyclical process, leading to complications in the design and operation of the equipment.

The water gas had a heating value of about 300 B.t.u. per cubic foot compared with the value of from 475 to 560 of coal gas, so that it had to be enriched. The enrichment entailed another cyclical process. The gas made at the end of a run period was hot and contained enough carbon monoxide so that it could be burned to heat refractory bricks enclosed in a "carburettor" vessel. When the bricks were hot enough, the heating gas was shut off and oil was sprayed on the bricks, where the heat caused the oil to be cracked into lighter hydrocarbon products. The resulting gas, which had a high heating value, was mixed with the gas made during the run period to produce what was known as "carburetted blue gas."

The companies originally sold a coal gas with a heating value of about 550 B.t.u. per cubic foot. Burners were therefore designed to handle a gas of that quality. With burner designs fixed, manufactured gas, no matter how it was produced, was usually adjusted to that heating value. On the introduction of natural gas it became necessary in some areas to produce a gas that could be mixed with natural gas. Fortunately the heating value of the carburetted gas could be controlled to a large extent by adjusting the type and quantity of oil sprayed on the refractory bricks.

Then there was "producer gas," which was even cheaper than carburetted water gas. It had a heating value of from 110 to 160 B.t.u. per cubic foot, which meant that it could not be widely distributed because the cost would be prohibitive. (Distribution costs account for much of the consumer's bill; even with natural gas the distribution costs in the District of Columbia represent 65 percent of the total delivered cost.) Producer gas served well, however, in industries that required a clean fuel for combustion purposes or a source of heat for manufacturing processes and that could make the gas locally, so that the cost of distribution was small.

Producer gas was made in a continuous process wherein a bed of hot coal or coke was blasted with air or a mix-

ture of steam and air. The final product necessarily contained nitrogen from the air and carbon dioxide resulting from the combustion of carbon with oxygen. The carbon dioxide could be removed, but the nitrogen diluted the heating value of the gas. This disadvantage was unimportant when the gas was burned as an industrial fuel but made it unsuitable as a synthesis gas (hydrogen and mixtures of hydrogen and carbon monoxide employed in making plastics, synthetic fuels and other synthetic products) and for distribution by utility companies.

Starting in about 1850 and continuing until World War II, the technology of making water gas and producer gas was improved steadily in the U.S. After manufactured gas lost its markets in the U.S. the technology was further improved in Europe, where coal was then the only indigenous fuel found in any significant quantity. New processes were investigated, taking advantage of technical advances in other fields such as the development of large-scale oxygen plants, new methods of handling solids in reactions with gas and improved construction materials. At about the time the technology had reached a stage where plants could be installed, however, natural gas was discovered in the North Sea and in North Africa. In addition most of the European nations decided to shift from an economy based on high-cost indigenous coal to one based on what was at the time low-cost imported petroleum. Few coal gasification plants embodying new technology were installed, and interest in further improving the technology flagged.

The two processes that were installed most often in Europe and elsewhere were the Lurgi fixed-bed pressurized gasifier and the Koppers-Totzek fully entrained, atmospheric gasifier. Both types served mainly to make synthesis gas for the manufacture of ammonia and other synthetic products, although in some places Lurgi plants made a gas that was distributed as city gas. Neither of these processes meets all the qualifications of an ideal

gasification scheme. An ideal process would be a single-stage, continuous operation employing air as the oxidizing medium; it would convert any type of coal into a combustible gas or a synthesis gas that was low in inert constituents.

Although both the Lurgi process and the Koppers-Totzek process are single-stage and continuous, they both rely on oxygen rather than air as the oxidizing medium. The Lurgi gasifier is pressurized, which for most applications of synthesis gas is an economic advantage over processes operating at atmospheric pressure. On the other hand, the Lurgi process requires a sized coal (fines must be removed) and a noncoking or weakly coking coal (because if the bed of coal cokes during gasification, it forms a solid mass that prevents the passage of gas through the bed and brings gasification to a halt), whereas the Koppers-Totzek process will function with any coal.

In the U.S. the renewed interest in coal gasification to produce a substitute for natural gas has led to serious consideration of installing Lurgi or Koppers-Totzek plants. Neither process, however, yields a gas that could substitute for natural gas because it does not have the heating value or the composition required. The gas resulting from each process is basically a mixture of carbon monoxide and hydrogen, plus a certain amount of methane distilled from the coal during heating. Carbon monoxide and hydrogen both have a heating value of 300 B.t.u. per cubic foot—far below the heating value of natural gas. Moreover, local gas companies would not be allowed to distribute such mixtures (although they once were) because carbon monoxide is poisonous and hydrogen is difficult to contain and also has burning characteristics that would require special burners.

Both processes could, however, make a raw synthesis gas that (after purification) could be methanated to yield a gas suitable as a substitute for natural gas. Methanation involves passing the gas over a special nickel catalyst

to convert it into almost pure methane, which is what natural gas is. So far, however, the methanation step has not been demonstrated on a commercial scale.

[Steps in Coal Gasification Chart Omitted]

Although research in the U.S. on coal gasification is now centered on making a low-cost synthesis gas from which a substitute for natural gas can be produced, in the near future coal gasification will also be employed to provide the raw material for the manufacture of other synthetics (alcohols, ketones, waxes and all types of petroleum products) and for the hydrogen required to produce synthetic liquid fuels from coal. The ratio of carbon to hydrogen is much higher in coal than in oil, coal liquefaction involves producing hydrogen from coal by a gasification process and reacting it with coal so as to increase the hydrogen content of the coal and produce an oil.)

In addition new regulations on the emission of sulfur oxides and the difficulties that have been encountered with stack-scrubbing processes have led to a renewal of interest in producing a low-B.t.u., low-sulfur gas from coal to be burned as a boiler fuel. Most of the early research and development on sulfur oxide control was centered on removing sulfur oxide from the Blue gases resulting from the combustion of coal. All the stack-scrubbing processes tested are reported to have been too unreliable for the sustained performance required for utility and industrial boilers, and the costs are much higher than originally anticipated. Two particularly troublesome problems are the large volume of gas that must be treated (making the cost of removal high) and the disposal in an ecologically acceptable manner of the solid waste material that is formed.

If coal is first gasified with air to form a low-B.t.u. gas, the resulting hydrogen sulfide can be removed by proved methods before the gas is burned in the boiler. The volume of raw gas to be treated would be less than half what

must be handled when sulfur oxide is removed from flue gas, and no environmentally troublesome by-product would be created. Interest in low-B.t.u. gasification as a means to the control of sulfur oxides has been further stimulated by the possibility that the more advanced processes being developed for producing high-B.t.u. gas could be modified for making low-B.t.u. gas.

Several new methods of coal gasification are being investigated, and two have reached the demonstration stage. Since most of the research has been directed toward producing a substitute for natural gas, all the processes have attempted to retain in the product gas as much as possible of the methane that is released during the early part of the process, when the coal is simply being heated. In this way the overall capital cost and the material requirements per unit of methane are reduced. Retaining methane is also advantageous when a low-B.t.u. boiler gas is made, because the methane makes for a lower cost and a higher quality.

The basic steps required to produce a synthetic natural gas from coal can be described in general terms [*see illustration on preceding page*]. First the coal is prepared, which entails crushing it to the desired top size, removing fines (if necessary) and extraneous material and drying the coal (if necessary for the subsequent steps). The coal is then either sent to the gasifier or, if it is a coking coal and the process cannot operate with such a coal, pretreated with heat to destroy its coking properties.

The coal is devolatilized, or distilled, either in the gasifier or in a separate vessel. As many of the distillation products as possible are retained to reduce the overall cost of gasification. Since these gases are distilled from the coal during the early part of the process and react more readily with either pure oxygen or the oxygen in the air than the char that is also produced does, the objective of retaining the distilled gases in the finished product requires special provisions to ensure that the gases do not

come in contact with the oxygen and steam put into the system subsequently.

[Hygas Process Chart Omitted]

For making high-B.t.u. gas most of the processes call for steam, oxygen and either coal or char as the feed materials. The oxygen reacts with part of the carbon to provide heat and raise the temperature high enough for the balance of the carbon to react rapidly with steam to produce a mixture of carbon monoxide and oxygen. If one wanted to substitute air for oxygen in order to avoid the expense of oxygen, the nitrogen in the air would dilute the product gas; therefore certain processes resort to a heat carrier as the means of providing heat. An inorganic material is heated in a separate vessel, with air as the oxidant. The material is then put into the gasifier, where it raises the temperature to the level required for the char or the coal to react with steam.

[Carbon Dioxide Acceptor Process Chart Omitted]

In making hydrogen, synthesis gas or high-B.t.u. gas the raw gas is next treated to remove tar and dust and is passed over a shift catalyst, which serves to speed up the reaction in which the four components of the gas (carbon dioxide, hydrogen, carbon monoxide and steam) reach equilibrium ($CO_2 + H_2 = CO + H_2O$). Any desired ratio of carbon monoxide and hydrogen can be achieved by adjusting the amounts of steam and carbon dioxide. When hydrogen is the desired final product, the carbon monoxide is all converted to carbon dioxide and scrubbed from the gas by any of several processes. In making synthesis gas, which figures in the manufacture of a wide range of chemical products, the ratio of carbon monoxide to hydrogen is adjusted to obtain the optimum composition for the chemical to be manufactured.

[Synthetic Process Chart Omitted]

When high-B.t.u. gas is the objective, the appropriate ratio of hydrogen to carbon monoxide is produced. The gas is then purified to remove the sulfur compounds that may be present. The reason is that the catalysts that have been tested for the crucial step of methanation are all nickel-based and are highly sensitive to poisoning by sulfur compounds.

No full-scale commercial methanation plant has yet been built. A test is under way, however, at a Lurgi plant operated by the Scottish Gas Board. The test, which started last fall and is being conducted by a consortium of American firms, will use 10 million cubic feet per day of purified Lurgi gas to demonstrate the efficiency of various methanation catalysts and the amount of cleaning that must be done to keep the catalyst functioning for an acceptable period of time. A second major engineering problem is the rapid removal of heat released by the highly exothermic reaction; if the heat is not removed, it can cause deterioration of the catalyst through sintering or the deposition of carbon.

A major alternative in making high-B.t.u. gas is to gasify part of the coal to form hydrogen and then to produce methane by the reaction of hydrogen directly with coal or char ($C + 2H_2 = CH_4$). Heat does not have to be supplied, since the reaction is exothermic. The products of the reaction are then methanated to eliminate any residual carbon monoxide and to bring the gas to a heating value acceptable for distribution through pipelines. The major advantages of direct hydrogenation are that it requires fewer materials and has a higher thermal efficiency than complete gasification followed by methanation over a catalyst.

Making a producer gas is a much simpler operation than making a high-B.t.u. gas. Because it requires fewer

steps and employs air rather than oxygen, the cost of making it on a commercial scale should be lower than the cost of making high-B.t.u. gas. After the coal or char has been reacted with air the hot raw gas, containing from 110 to 160 B.t.u. per cubic foot, is treated to remove tar and dust and further treated to remove hydrogen sulfide. The product is a low-B.t.u. gas suitable for boiler fuel. Since a substantial amount of natural gas (34 percent in 1971) is consumed by industry, any substitution of producer gas made from coal would reduce or even eliminate the problems arising from the present short supply of natural gas.

The two new processes that have reached the demonstration-plant stage are the HYGAS process, which is being developed by the Institute of Gas Technology, and the CO_2 Acceptor process, which is a project of the Consolidation Coal Company. Other processes, which are at or approaching the pilot-plant stage, include the BI-GAS process of Bituminous Coal Research, Inc., and the Synthane process of the U.S. Bureau of Mines. All the processes under investigation can be classified in various ways: by the method of supplying heat for the gasification reaction (internal heating or external heating); by the method of achieving contact between the reactants (fixed bed, fluidized bed or entrainment in the gasifying medium); by the flow of reactants (concurrent or countercurrent); by the gasifying medium (hydrogen or steam plus oxygen, air or enriched oxygen), and by the condition of the residue removed (slagging, which means that the residue is liquid ash, or nonslagging, which means that it is dry ash). Nearly all the combinations of ways to gasify coal represented by these classifications have been investigated.

In the absence of full-scale commercial plants the cost of coal gasification can be only roughly estimated, and the estimates must be viewed with caution. In a presentation to the Panel on Coal Gasification of the National

Academy of Sciences representatives of the Lurgi process estimated that as of about the beginning of 1972 the capital cost of a gasifier producing 250 million cubic feet of gas per day would be from $180 million to $190 million. The estimate did not include working capital, interest during construction or start-up expenses; these items would increase the cost to about $250 million, based on 1970 dollars. In the fall of 1973 the El Paso Natural Gas Company estimated the cost of a similar plant at more than $400 million. All the newer processes are estimated to have somewhat lower capital costs than the Lurgi process [*see illustration above*].

[Gasification Costs Chart Omitted]

An entirely different technology that is attracting interest is gasifying coal underground. The idea is not new, and a fair amount of research was done on it in various countries until about 1960. Concern about shortages of energy has focused attention on it again.

Any process would require the creation of enough permeability in the coal so that a stream of air could flow from one point in the seam to another point without undue loss of pressure. The coal could then be ignited at either end and gasification would begin. Part of the coal would burn with the injected air, producing a mixture of carbon monoxide, carbon dioxide and heat. If good contact between gas and solid could be maintained, the hot carbon dioxide would then be reduced to carbon monoxide by a reaction with the hot coal. The product would be a producer gas.

Experiments in underground gasification of coal have created the required permeability by a number of methods that entail digging shafts or by one or another variation of the percolation methods, in which two holes are drilled from the surface to the coal seam and then connected so that air can flow between them. The experiments have

been able to produce a combustible gas, but they do not do so continuously and the gas does not have a constant heating value. Most of the tests have resulted in poor recovery of the available coal and have failed to achieve the level of control of the solid-gas contact that is required to produce consistently a gas of high quality. Many other problems, such as subsidence of land and contamination from ground water, have not been solved.

A number of new approaches have been proposed. They include breaking up the coal with explosives and linking boreholes by drilling with lasers. If a successful method could be developed, the energy from coal in the ground could be extracted with little or no requirement for underground manpower. Moreover, it might be possible to extract the energy from coal seams that are too thick, too thin or too poor in quality to be exploited by conventional methods.

COAL HANDBOOK

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* * * *

II. CLASSIFICATION OF COAL BY RANK

Coal deposits were formed from plant materials by the action of heat acting through long periods of time, supplemented by the effect of pressure. The first stage of coalification involves the formation of peat, then lignite, followed by subbituminous coal, bituminous coal, and finally anthracite. Plants and trees contain about 50% water and have a *dry-basis* heat content of about 8000 to 9000 Btu/lb.[1] The chemical composition of the plant kingdom consists mainly of varying ratios of the multi-ring highly oxygenated organic compounds cellulose and lignin. The coalification process can be regarded as a progressive elimination of oxygen in the form of carbon dioxide and water, such that the concentration of carbon in the remaining material increases. Thus, the 30 to 50% dry mineral-matter-free oxygen content found in plant material progressively reduces to 20 to 25% for lignite, 10 to 20% for subbituminous coal, 5 to 10% for bituminous, and to as low as 1% for anthracite. There is a concurrent increase in mineral-matter-free heat content from 4000 to 4500 Btu/lb for plant materials to near 15,000 Btu/lb for some bituminous and anthracite coals.

Classification of coal by rank as presently utilized in the United States is shown in Table 1, together with ultimate analysis carbon/hydrogen/oxygen ratios for the various ranks. The American Society for Testing and Materials (ATSM) ranking system classifies coal according to fixed carbon or volatile matter for medium-volatile bituminous through anthracite coals, on the basis of both fixed carbon and heat content for high-volatile A bituminous coals and on the basis of heat content for lignite through high-volatile B bituminous coal. The British National Coal Board has established a ranking system based on coal volatile matter and coking properties and there is

TABLE 1 Classification of Coals by Rank

Class	ASTM classification method: Limits of fixed carbon[a] (% w/w)	Limits of heat content[a] Btu/lb)	Carbon	Hydrogen	Oxygen
I. Anthracite	86-98	-	90-97	3-5	1-3
II. Bituminous			85-90	4-5	5-10
low-volatile	68-86	-			
medium-volatile	69-78	-	-		
high-voltaile A	<69	< 14,000			
high-volatile B		13-14,000			
high-volatile C		11,500-13,000			
III. Subbituminous		8,300-11,500	75-85	5	10-20
IV. Lignitic		6,300-8,300	70-75	4-5	20-25
(Plants & trees)	25-30	4,000-5,000 [1]	50-60	5-6	35-40

[a] Mineral-matter-free (mmf) basis. To convert to MJ/kg, multiply by 0.00232.

[b] Dry mineral-matter-free (dmmf) basis, normalized for exclusion of sulfur and nitrogen.

an international system of coal classification based on volatile matter, heat content, and coal coking properties.[2]

III. PHYSICAL AND CHEMICAL STRUCTURE

To the naked eye, coal appears to be a compact stratified material. It is chemically and physically complex, having a physical microstructure that is discernibly derived from plants, and a chemical structure containing a wide variety of polymeric organic compounds and crystalline minerals.

The structure of coal is presented visually in the following section beginning with photographs of features visible to the naked eye and apparent to the touch, and progressing in ever-smaller dimensions through fossilized plant structures discernible in two-dimensional perspective by optical microscopy (10^{-4} to 10^{-6} m) and in three dimensions by the electron microscope (10^{-6} to 10^{-7} m or 10,000

to 1000 A), culminating in a model representation of the molecular structure of the coal organic matrix (atomic and molecular features a few angstroms in size). The chemical structure of coal will be built up starting with the elemental composition, arrangement of the elements as molecules, and molecules as a polymeric and crystalline continuum.

A. Visual Properties

Coal petrography is based on the macroscopic and microscopic appearance of coal as well as secondary differentiations made on the basis of coal hardness and density. It is these latter properties that allow mechanical separation of visibly differentiated coal components.

1. Macroscopic Properties

Blocks of bituminous coal are shown in Fig. 1 as seen by the naked eye. Certain structural features are at once evident. Brilliant shiny bands can be seen as a single 3-cm-thick layer (labeled V) or as thin 2 to 5-mm sheets alternating with bands of dull appearance (labeled C—the combined effect is a bright look). A less regular area of gray (labeled D) is also seen as well as a charcoal-like region (labeled F) in the top portion of Fig. 1a. Coal petrography begins here, in the consideration and identification of the composition of these and other structural features. These regions are termed "lithotypes." The brilliant shiny band is vitrain, the gray area is durain, the bright region is clarain (alternating bands of vitrain and durain), and the charcoal-like area is fusain.

This block of coal, and coal in general, can be crushed and the fragments separated by lithotype. The vitrain fragments are very shiny, clean to the touch, and if equal force has been applied, noticeably smaller in size than either durain or clarain. The durain fragments are dull gray in color, and the largest in particle size, as durain is the hardest lithotype. The fusain material is soft and char-

coal-like and crushes to a fine-grained powder that soils the hands if picked up. The term "durain" is often used for dull coal and the term "fusain" for fossil charcoal.

FIG. 1 Photographs of bituminous coal; scale bar, 5×10^{-2} m: (a) fusain (F), vitrain (V), and clarain (C) lithotypes; (b) clarain (C) and durain (D) lithotypes. [Courtesy of R. J. Helfinstine and R. D. Harvey, Illinois Geological Survey, Urbana, Ill.] [Omitted]

TABLE 2 Coal Petrographic Classification [3]

	Megascopic	Microscopic
Rock type	Appearance	Dominant maceral groups
Simple vitrain	Brilliant black luster, very friable into small cubes, clean to the touch	Vitrinite
fusain	Charcoal-like, very friable into soiling black powder, difficult to wet	Inertinite
Complex clairain	Bright with alternating bands of vitrain (brilliant) and durain (dull), fairly friable	Vitrinite and exinite
durain	Dull gray color, very hard, difficult to crush	Inertinite and exinite

2. *Microscopic Properties*

When the lithotypes are polished, etched, or cut into thin sections and viewed in an optical microscope at magnifications of roughly 50 to 1000×, a number of microscopic petrographic units can be seen. These are related to the plant origin of coal and are termed "macerals." There are so many types of macerals that three major maceral groups have been designated: vitrinite, exinite, and inertinite. The dominant maceral-group composition

of each macroscopic lithotype discussed above is shown in Table 2.

Relatively high magnification photomicrographs of a thin section of bituminous coal are shown in Fig. 2. Figure 2a, taken in transmitted light, shows the three maceral groups. The black irregular shaped lenses (mainly upper left) are inertinite. The finely laminated and global material (center) is vitrinite. The globule is about 15×10^{-6} m thick. The white lenticular particles (largest are at the bottom) are exinite. The small elliptical white spots ($1\text{-}3 \times 10^{-6}$ m in diameter) are holes in the thin section where particles of pyrite and quartz occurred but were plucked out of the coal during preparation of the specimen. Figure 2b was taken in reflected light and is of the same specimen section. The detailed structure of the vitrinite (the gray matrix of the photograph) is not resolved in reflected light, but the structure of the inertinite and exinite particles are most evident by this method of examination. Inertinite appears white (mainly upper left) and exinite is dark gray (largest segment at the bottom) under reflected light.

Individual macerals have been found to have significant density differences. For coals of the same rank, the density of macerals decreases in the order: fusinite, micrinite, vitrinite, exinite [4]. Maceral densities for specific ranges of carbon content are shown in Table 3. Thus, macerals can be concentrated, according to specific gravity, into components enriched in specific macerals by various float-sink separation techniques.

FIG. 2 Photomicrographs of a polished thin section of Davis Member bituminous coal from southern Illinois; scale bar, 40×10^{-6} m: (a) taken with transmitted light (I, inertinite; V, vitrinite; E, exinite); (b) taken with reflected light. [Courtesy of R. J. Helfinstine and R. D. Harvey, Illinois Geological Survey, Urbana, Ill.] [Omitted]

TABLE 3 Some Properties of Macerals

	[a](calc)	Carbon content (%)	Reference
Vitrinite	1.3	84-89	5
Fusinite (inertinite)	1.5	92-95	6
Exinite	1.2-1.3	86-89	5
Micrinite (inertinite)	1.4	87-90	5

Scanning electron microscopy (SEM) offers a way to view three-dimensional microscopic details that are thousands or even hundreds of angstroms in size (10^{-7} to 10^{-8} m). Many important coal microstructural features, such as cellular components and cell-contained mineral microcrystals, can be viewed in this way. These units are only two to three orders of magnitude larger than the organic molecules making up the coal molecular structure.

A SEM view of the top of a fresh fracture of a high-volatile C bituminous coal sample is shown in Fig. 3a at $30 \times$ magnification. The coalified (carbonized) plant fibers run from left to right.

A side view of the stacked fiibers looking into the fiber openings is shown in Fig. 3b. The scale bar measures 20×10^{-6} or 200,000 A. It can be seen that the cell walls are on the order of 20,000 A thick, while pore openings of 500,000 A in radius are ubiquitous and openings as small as 50,000 A in radius can be seen clearly. These pores are relatively large compared to pore radii identified in adsorption studies, which vary from 75,000 to less than 20 A [7]. The cell structure is seen to be compressed and distorted in the region shown in Fig. 4a with little pore structure remaining. A fresh fracture surface of coalified plant debris is shown in Fig. 4b. Some possible pore openings can be seen in the middle right section of the figure with radii of 1/10 to 1/100 of the scale bar or 1000 to 10,000 A.

Pores of radii 1000 to 75,000 Angstroms as shown in Figs. 3b and 4b total roughly one-third to two-thirds of the pore volume of bituminous coals, while the total porosity volume generally centers around 10% of the coal volume [7,8].

The intimate association of minerals in coal with the organic coal matrix is shown in Fig. 5a, where deposits of micrometer-size pyrite crystals can be seen within the coalified plant fiber. A closer look at some pyrite mineral matter is shown in Fig. 5b, where individual pyrite crystals and a spherical crystal assembly (known as a framboid) are seen.

B. Chemical Structure

The major elemental components of coal are carbon, hydrogen, and oxygen; the minor elements include sulfur, silicon, nitrogen, aluminium, iron, calcium, magnesium, potassium, sodium, and titanium. Essentially all of the remaining elements occurring in the earth's crust have either been identified in trace amounts or are likely to be present in coal. Carbon is by far the most abundant.

* * * *

III. ELEMENTS OF CLEANING PROCESSES

Although the direct objectives of present coal-cleaning practices are the reduction and control, within predetermined limits, of size, moisture, ash, and, sometimes, sulfur, the properties of coal that have a direct bearing on whether, and how, coal should be cleaned are wider than this list suggests. Thus, the rank of a coal (rank being a complex property descriptive of the nature of the coal substance but not of its impurities) can play a very important role in determining the feasibility and the extent of cleaning.

A. Composition and Rank

Pure coal consists mainly of carbon (C), with lesser quantities of hydrogen, oxygen, nitrogen, and sulfur (H, O, N, S). Compounds of these elements provide the combustible material that constitutes coal's value as a fuel, as measured by the calorific (higher heating) value. These compounds are contained in an organic matrix said to consist of "macerals," to identify them from inorganic materials, which are usually present as impurities assembled in various crystalline matrices termed "minerals." Except for minute quantities of silicon, calcium, and magnesium associated with vegetal material, virtually all other elements found in a coal, other than C, H, O, N, and S, will be associated with the mineral impurities.

When coal is burned, the whole of the macerals present are converted to gaseous combustion products and the mineral impurities present remain as an ignited residue termed "ash." It is important to observe that ash is not the mineral matter originally present in the coal, but the residue remaining after those minerals have been heated to high temperature in air, so that, for example, carbonates initially present will have decomposed and lost carbon dioxide; and pyrites will have oxidized, losing sulfur as sulfur oxides to the products of combustion, leaving iron oxides as a constituent of the ash. Changes resulting from decomposition of the mineral matter in this manner do not make any contribution to the calorific value of the coal, usually detract from it, and where calorific values must be measured accurately, require corrections of the measured values. However, these corrections are not large and it is sufficient for practical purposes to take the ash content, which is easily and rapidly determined, as a direct measure of the mineral impurities present in a coal.

In coalification, or the metamorphosis of vegetal materials to coals, which is generally recognized to follow the sequence peat, lignite, subbituminous, bituminous, and

anthracite, significant changes in the relative proportions of C, H, O, N, and S occurs, the chief of which is the increase in C and the elimination of some H, O, N, and S as large volumes of methane and carbon dioxide are released. Where coals are pyrolyzed, this process is continued by virtually complete elimination of H and O. The carbon residue that remains, however, still contains small quantities of N and S. Typical values for C, H, pyrolyzable matter (volatiles), and residual carbon (fixed) of the various classes of coals are shown in Table 6. This table provides the basis of a system for describing coal rank, which increases as one proceeds down the table. Increasing rank is associated with decreasing volatile matter and increasing calorific value. There are a number of systems of classification.

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GEOLOGY AND COAL-BED METHANE RESOURCES OF THE NORTHERN SAN JUAN BASIN, COLORADO AND NEW MEXICO

EDITED BY:

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PUBLISHED BY:

ROCKY MOUNTAIN ASSOCIATION OF GEOLOGISTS
DENVER, COLORADO

1988

Completing, Equipping, and Operating Fruitland Formation Coal-Bed Methane Wells in the San Juan Basin, New Mexico and Colorado

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and
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ABSTRACT

This paper is a review of drilling, completing, equipping and producing procedures used by operators in the San Juan Basin for Fruitland Formation coal-bed methane wells. Drilling fluids for both open- and cased-hole completions are compared as well as perforating and stimulating techniques. Coal-gas wells have special problems requiring design modifications of production equipment. Artificial lift methods such as the pump jack, gas lift, and progressive cavity pumps, which are in operation on Fruitland coal wells are discussed. Water disposal is a major problem for most Fruitland coal wells. Three disposal methods, evaporative units, evaporative pits, and disposal wells are evaluated. Finally, engineering challenges like zone identification and well spacing concerns are reviewed.

INTRODUCTION

Even though the first San Juan Basin Fruitland Formation coal-bed methane well was developed over thirty-five years ago, the best completion technique for coal-bed methane wells has still not been clearly established. Completion and operation of Fruitland coal-gas wells begins

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with a decision; to drill and complete to minimize damage or to drill and complete to maximize control, and then repair damage done. This basically translates into choosing between an open-hole completion and a cased-hole completion of the coal zones and is a matter of cost versus return.

An open-hole completion assumes a larger hole, gravel pack or liners, less controlled stimulation, if any, production of coal fines, and perhaps a high incidence of clean-out and other workovers. Cased completions assume a smaller hole, perforations, controlled stimulations to bypass formation damage, minimal coal-fines production, and moderate clean-out and repair workovers. This paper has been prepared to assist operators who must answer questions like: Should the completion be open or cased hole?, What kinds of drilling fluids will be required?, Should the well be completed natural or should it be stimulated? In addition, current production equipment design and artificial lift methods for coal-gas wells are reviewed. Engineering challenges such as water disposal and well spacing are outlined in the final sections. Although not intended to be a highly technical analysis, this paper presents a discussion of past and current operating procedures. We have not concluded that there is a best way to develop Fruitland coal-gas wells, but we have outlined some of the problems encountered by experienced operators.

OPEN-HOLE COMPLETIONS

Defined as "no cement on the formation", open-hole coal-bed methane wells have proven so far to be the best producers. Typically, 7-inch or larger casing is set above Fruitland Formation coal zones and then some type of fluid is used to drill out. Completing "barefoot" (no casing through the open-hole section) is best suited when dealing with a single coal zone or closely grouped coal zones. When the open-hole well bore penetrates several

coal zones extending over 100 to 300 feet, then some type of liner is usually employed.

Slotted liners and gravel pack completions have been tried on several Fruitland coal-gas wells over the past eight years and they have had mixed results. Back flushing of the pack or liner is usually necessary because of plugging. Coal fines, which have a wide range of size, easily bridge in the gravel or liner slots and can severely restrict the flow of gas and water.

Once a liner is installed through the coal zones of interest, it is usually perforated with a high density pattern of 4 to 12 shots per foot. For better control, one operator initiated running liners with predrilled 1 inch holes spaced 12 per foot. Temporary plugs were screwed into the liner's holes while it was being run and set in the well bore. Then the plugs, which extend into the inside of the casing, were milled off. This resulted in a liner with many large perforations at a reasonable cost. In some cases, predrilled or perforated liners set through the coal zones can plug with coal fines. To clean out an open-hole perforated liner plugged by coal fines, one operator washed the holes with water at high rates through a packer-like tool on the tubing. Another technique to clean up a plugged open-hole well is to pump 50 percent quality foam and then flow the well back.

CASED-HOLE COMPLETIONS

Cased completions of Fruitland coal zones are commonly 7-inch, K-55, 23-pound casing set through the coal zones or topset, and secondly 5½-inch, K or J-55, 15.5-pound casing set through and perforated. Wells exist with 4-inch or 4½-inch casing, but they are not common. In situations of low water volumes and low fines production, or in areas of dry-gas production, smaller casing design is both operationally and economically effective. Larger sized casing allows for greater volumes of water and fines

to be pumped. More importantly, perhaps, using larger casing removes any potential limiting-strength factor in stimulation design allowing the operator to frac down the casing. Overall, the decision on casing size is an economic one with 5½-inch casing set in an 8¾-inch or 7⅞-inch hole being most common in cased-through completions; 7-inch casing set in an 8¾-inch hole is very common in topset-completions with liner or with gravel pack. Gas and fluid is produced up the tubing and gas may or may not be produced up the annulus.

Many different cementing systems have been used on Fruitland coal-gas wells with varying degrees of success and cost effectiveness. To minimize formation damage, light-weight cements were achieved with nitrogen foam or glass bubbles added to the slurries. Separation problems and occasionally stimulation problems were encountered when light-weight cements were used. A typical cement for a Fruitland coal-gas well would be 50/50 Pozmix with 2 percent gel, 10 percent Calseal (gypsum), and usually some gilsonite for lost circulation control with a weight of 13.5 to 14.0 pounds per gallon.

If an operator elects to do a case-hole completion of a Fruitland coal-gas well, then some care and expense should be part of the design to protect the permeability of the cleat systems that naturally occur in the coal zones. Cement and drilling mud invasion should be a concern. It has not adequately been demonstrated that a chemical interaction between cementing fluids and the coals occur, but it has been suggested that clay in the Fruitland coals does swell in the presence of water.

DRILLING FLUIDS

Determining what fluid to expose the coal zones to is a major decision for an operator. Drilling fluids are selected to control formation pressures and to minimize formation damage during drilling and completion operations. In-

creasing the complexity of this decision is the stability of the coal zones when exposed to different hydrostatic pressures.

Perhaps similar to unconsolidated sandstone formations, coal zones usually flow coal fines when subjected to a low hydrostatic pressure. Drilling through the coal zones with natural gas, air, or air-mist, typically causes an intense flow of coal fines in the returns. Large chunks of coal, up to several inches in diameter, have been observed. Some operators complete their wells this way knowing their coal zones are significantly washed out or perhaps even a cavern has been formed.

In contrast, some operators maintain a high hydrostatic pressure to limit the flow of coal fines. Typically a gel mud, polymer mud, or heavy salt-fluid is used. It has not been clearly established which technique protects the permeability of the natural cleat system best.

Correctly weighted gel or polymer type muds provide good pressure control and hole cleaning capabilities with a strong possibility of formation damage. Whereas heavy fluids containing zinc chloride or magnesium chloride provide good pressure control and minimize formation damage. However, heavy fluids are quite expensive and somewhat difficult to work with because of their corrosive nature.

A typical mud program for cased-hole wells consists of either a gel- or starch-based mud, or a low solids non-dispersed system to the top of the Fruitland. To drill through the coal zones, the mud weight is usually increased to 10 pounds per gallon or higher, depending upon the geologic location. If the coal zones in an area are known to be primarily gas saturated, then a higher mud weight is required compared to an area where the coal zones are primarily water saturated.

Increasing the mud weight just before drilling into the Fruitland permits maximizing the penetration rate and

should provide adequate protection from blow-outs. Great care must be taken to avoid an excessively overbalanced condition. Overweighted mud could permanently seal the natural permeability of the coal zones which would also seriously affect stimulation behavior. Some operators add potassium chloride to their mud systems to lessen the possibility of formation damage from the mud filtrate.

Completing a Fruitland coal-gas well open hole is usually done to reduce formation damage as much as economically feasible. Table 1, a drilling fluid comparison, presents the general relationship of pressure control, potential for formation damage, and expense. These factors need to be balanced to determine the best operating procedures for drilling and competing wells.

Table 1. Drilling fluid comparison.

Fluid	Pressure control	Formation damage	Expense
1) Weighted mud	Good	Possible	Moderate
2) Heavy fluids	Good	Unlikely	High
3) Produced water	Fair-good	Unlikely	Low
4) Natural gas or air	Poor	Unlikely	Moderate
5) Air mist	Poor	Unlikely	Moderate
6) Foam	Fair-good	Unlikely	Moderate-high

Air-mist or stiff foam have been used as alternative drilling fluids to mud, air, or natural gas. It is usually difficult to control formation pressures with air-mist fluid during drilling and completion. While foams can control the pressures, the cost generally exceeds that of muds. Foam has also been used to clean out open-hole wells which were plugged or bridged with coal fines.

Certain operators have been fairly successful using produced coal-formation water to drill and complete open-hole coal-bed methane wells. Continuously pumping produced water or alternating between water and gas down the drill string causes the well to flow in a heading manner, unloading slugs of gas, water, and coal fines. This

well bore flushing technique tends to keep the coal fines in upward motion.

Produced water is also used to circulate out sand and coal fines after a cased-hole well has been stimulated. Once the hole is clean, rods and a pump are installed and the well is put on production. Produced water is popular in both cased- and open-hole completions because it will not damage the formation and it is inexpensive.

Overpressured Fruitland coal-gas wells are capable of unloading a column of produced water. Well control is achieved by maintaining back pressure with a snubbing unit. When actually drilling or cleaning out the well bore, back pressure is not maintained. The snubbing unit enables the operator to hold back pressure on the well during bit trips or while running a liner.

When using fluids like natural gas or air for drilling and completing operations, the formation will frequently flow massive slugs of coal fines. In this situation the field personnel should be advised not to sharply over pull the drill-string weight. Such an action could cause the coal fines to bridge or pack around the drill string. It is better to keep the drill string rotating while only pulling up 5 to 10 points (thousands of pounds), then slack off and repeat until the drill string is free. This method of keeping the bit down in the flow has prevented numerous fishing jobs.

PERFORATING

Given a cased completion and the presence of some fluid used during drilling, two simulation plans need to be considered to open the formation: 1) A perforating plan that allows maximum stimulation and clean up; and 2) A perforating plan that allows maximum productivity of the formation. Perhaps the most common technique is four jet shots per foot (JSPF) over the entire coal zone with hole sizes of 0.38 to 0.50 inches. Usually there is some separation between the coals and the top of the

Pictured Cliffs Sandstone. The intent is: 1) To provide maximum surface area for production which minimizes damage from drilling; 2) Maximize formation control in terms of fines and pressures; and 3) To allow controlled stimulations.

In wells that have a single thick coal zone (20 feet or greater), some operators have gone to a limited-entry approach of 2 JSPF over part of the total zone. This approach is somewhat cheaper and may be as effective as 4 JSPF in achieving effective stimulations. Available data is limited, but does suggest that high break-down pressures can be encountered in both scenarios. Factors such as acidization, time before stimulation, and fracturing strength of the coal could be more significant than the number of perforations.

Casing slotting which is used in the Black Warrior Basin, has not become popular in the San Juan Basin. This is perhaps due to the cost of slotting or to the effectiveness of other perforating techniques. Slotting in terms of stimulation would create a well bore that would behave as an open hole and most likely would limit the overall-treatment effectiveness. Slotting could have value over perforations in naturally-completed wells.

STIMULATION

Given a cased Fruitland coal-bed completion, stimulation is almost a necessity, and occasionally should be considered for open-hole completions. Stimulations typically use cross-linked gelled water or 70 percent nitrogen foam. Non-propped fracs have been tried with both gel and foam. There is no apparent increase in effective permeability associated with either fluid due to the high closure-stresses of the Fruitland coals. Straight water fracs with low sand concentration of up to two pounds per gallon at suitable rates, while not common, appear to be effective and appear to increase effective permeability.

At this time, a very common stimulation is a cross-linked gelled water frac at rates above 30 barrels per minute (BPM) and greater than 50,000 pounds of 10/20- or 12/20-mesh sands; volumes of 100,000 gallons and 100,000 pounds are quite common in thick zones. The intent is to create a wide vertical fracture of as great a length as possible, perhaps at concentration of 6 pounds per gallon or higher. Break-down pressures can be quite variable. Foam is a more expensive medium that generally requires higher horsepower for injection of comparable volumes. It is unclear as to whether there is a difference in effectiveness of foam and cross-linked gelled water jobs. The tendency towards larger jobs and even massive hydraulic fracs of 400,000 pounds or more of sand suggests that gelled water-jobs are becoming the most common stimulation. Massive fracs that stay vertical appear to be more effective in creating frac length, but the resulting increased gas-production rates may not be enough to be cost effective.

At larger volumes of higher pressure the tendency to flow back sand can be very pronounced, and at least one operator has gone to resin-coated sands to seal the area around the well bore, preventing flow back and preserving permeability. This is an operational and economic decision dependent upon volumes and pressures anticipated.

Stimulation in open-hole completions in thick coal zones and multiple coal zones tend to be less effective in that they enter only parts of zones or single zones and flow back excessive fines and sands regardless of fluid and sand volumes. Open-hole completions result in much less control of the formation than is necessary for multiple completions and production operations.

PRODUCTION EQUIPMENT

Regardless of the type of completion, Fruitland coal-gas wells are usually troublesome to produce because of coal fines. Completed coal zones can be unstable resulting in production of various-sized coal fines in conjunction with the production of methane-gas and water. Coal fines, ranging in size from dust to chunks, create problems which require some design modifications to typical oil field production equipment.

Design considerations and field operation of wellheads, separators, filters, dehydrators, and evaporative units are discussed in the following sections. This summary is based on personal experience and conversations with equipment manufacturing representatives, production engineers, and field personnel.

Wellheads

Fruitland coal-bed methane wells in the San Juan Basin are typically overpressured. In the northern part of the San Juan Basin numerous drill-stem tests and producing wells indicate a pressure range for the Fruitland from 108 percent to 140 percent of hydrostatic pressure (K. C. Bowman, written communication). These percentages translate into surface shut-in pressures of 1,400 to 1,700 pounds per square inch gauge (psig).

Wellheads with a 2,000 psig rating are acceptable, however, a 3,000 psig rating is recommended to handle the abrasive of the coal fines when moderate flow rates are expected. Some operators who have high-volume wells (2 to 4 million CFPD and (or) 1,000 to 2,000 BWTD3, use 5,000 psig-rated wellhead equipment.

Flow lines are typically 2-inch, however, for high volume wells, 3-inch flowlines are necessary and schedule 80 pipe is desirable to provide some protection against abrasion. Full-operating ball valves for flow control will be less likely to plug or cut out.

Separators

Gravity separation, production equipment's best friend, has trouble dealing with coal fines. Microscope-sized coal

dust stays entrained in the gas stream and must be filtered out. Large pieces or chunks of coal, ⅛ inch to 1 inch or greater, frequently plug or cause malfunctions in the separator's liquid dump valves and other controllers. Medium-sized coal fines usually are gas saturated and float at the gas-water interface in the separator requiring extra setting time.

Determining the best method to deal with the Fruitland's pressure is a primary element in surface-equipment design. If one elects to use standard-rated production separators with a maximum working pressure of 1,000 psig, then pressure control is necessary. Pneumatic motor valves controlled by a pressure-sensing element provides the necessary flow control for safe operations.

When working with 2-inch flow control valves the frequency of plugging can be high. Motor valve trim, seat, and (or) stem, can erode quickly with high flow rates and (or) coal-fine production. Keeping a separator's safety controls in working order can be a challenge. Use of 3-inch flow control valves results in less plugging, however the expense can be significant. The initial cost of a 3-inch motor valve is five to eight times higher than the 2-inch model and replacement parts follow suit.

Experience obtained from operating pressure-control equipment on coal-gas-well separators has caused some operators to increase the maximum working-pressure rating on their units. It is approximately 25 percent more expensive for a separator with a 1,440-psig rating than the 1,000-psig standard model. Increasing the maximum working pressure to 1,700 psig causes a price hike of 35 percent over the standard model. However, higher initial costs can be offset through lower maintenance expense and less downtime for repairs. These factors combined with the increased safety margin makes the higher-pressure-rated approach worth considering.

Most Fruitland coal-gas wells produce gas, water, and coal fines requiring two-phase operators. Because the gas-

to-liquid ratios on these wells are usually low, vertical separators work best. Also, flowing Fruitland coal-gas wells tend to produce in a heading or slugging manner and a vertical separator should have large liquid capacity to handle this.

In the event a Fruitland well makes some condensate or oil, a two stage separator is recommended. A high-pressure vessel separates the gas from the liquids and then a low-pressure vessel separates the oil from the water. Condensate from Fruitland completions and commingled Fruitland-Pictured Cliffs completions is usually high in paraffin content which requires special handling, such as heaters in the stock tanks.

There are many factors to consider when sizing a separator for a Fruitland coal well: Obviously the production rate of gas and water are important, however other factors such as slug capacity, retention time, and operating pressures play a significant role in design. Floating coal fines in the water phase requires additional retention time for separation. Increasing the retention time from 1 minute (typical for oil separators with non-foaming conditions) to 3 minutes, decreases the liquid capacity by 67 percent.

Overall, it is recommended that a coal separator be sized with conventional design parameters and then increased to the next commonly available pipe size. In other words, if a design analysis requires a 20-inch-diameter by 10-foot-long vessel, then the size should be increased to a 24-inch by 10-foot size. If a 24-inch diameter is calculated then use 30-inch pipe. Optionally, increasing the length of the vessel also provides an economical way to achieve greater capacity, particularly when designing for high maximum working pressures. Once the initial gas head from a Fruitland well is produced, usually fairly quickly, warm formation water, 70 to 80 degrees F at the surface, prevents any freezing problems. A water bath around half of the separator vessel provides sufficient heat.

Multiple-pass flow coils in a heater water bath are usually not necessary.

Separator control equipment, when exposed to coal fines and slug flow, can malfunction. A backup system for the liquid level controller and dump valve will decrease operating problems. A secondary-level controller mounted above the primary controller with the output signal sent to both the primary and secondary dump motor valves is good insurance to prevent liquid carry over.

Motor valves which dump the separator's liquid should have large trim to prevent plugging. Also snap action is preferred over throttling because of the coal fines. Some operators are using a motor valve designed for paper mill slurries that has a rotating ball action. A preferred design would have a full-opening isolation valve upstream of the liquid dump valve for convenient maintenance.

Conventional mist-extractors in coal-gas-well separators can plug with coal fines. This problem is decreased by installing a vein-type mist extractor followed by a conventional wire-mesh type. One design permits the mist extractor to be back flushed through a mounted nozzle system. If plugging is a severe problem then the increased expense of a removable head is justified.

Filtration Units

Small coal fines in the gas stream and separated-water system require filtration. Produced gas from the separator should go through a cartridge-type filter to prevent downstream problems in the dehydrator, compressor, and (or) meter. Filtration of produced water is usually required to prevent damage to a disposal well.

Gas filters can be free standing units with sufficient working pressure rating. Once separator design incorporates the filter in the separator's water bath to prevent freezing and to allow for convenient maintenance. Replacement frequency of the filter cartridges depends on a

coal-gas well's average production of fines and the occurrence of liquid carrying over from the separator.

Competency of filters can be stated in nominal or absolute terms. An absolute filter is rated to stop all particles larger than the specified size, that is, a 10 micron absolute filter stops all particles larger than 10 microns in size. A nominal competence is an arbitrary rating determined by the manufacturer based on the weight percent of removed particles. A test of a 1-micron nominally rated filter showed that no 1-micron-sized particles were stopped, while particles up to 50 microns were passed.

San Juan Basin operators working with Fruitland coal-gas wells are using 20- or 25-micron nominal filters for gas. Produced water is cleaned up with 10-micron absolute or 2-micron nominal filters before it is injected into a disposal well. Filtration procedures increase the cost of operating coal-gas wells but this should be recouped through less downtime.

Dehydrators

Dehydration of coal-bed methane is the same as conventional glycol-based systems developed for gas wells. Design parameters that might be different are maximum operating pressure, inlet gas temperature, and carbon dioxide content. Glycol absorption of water vapor works best at low gas temperatures (65 to 70 degrees) and higher operating pressures.

In the preceding discussion of separator design, pressure-control alternatives were outlined. If the production-facility design specifies that the separator is to handle pressure control, then a standard 1,000 psig, maximum-working pressure dehydrator unit would be appropriate. In a design case where the separator has no pressure control, the dehydrator design should incorporate pressure control to protect the gathering facilities in a worst-case scenario.

Use of a compressor on a coal-gas well for gas-lift operations or for lowering the wellhead pressure can significantly increase the flowing temperature of the gas. Glycol-absorption efficiency decreases as the temperature increases. An overall analysis of production mechanics will insure that the maximum water content allowed by the gas-purchase contract will not be exceeded.

Another topic in most gas-purchase contracts is the maximum allowed level of carbon dioxide in the produced gas. Coal-gas wells produce varying amounts of carbon dioxide and treatment facilities are sometimes necessary. If the gas analysis shows more than 10 percent carbon dioxide, then the use of some stainless steel elements in the dehydrator should be considered.

Evaporative Units

There are several evaporative units in service on San Juan Basin Fruitland coal-gas wells. Basically, evaporative units boil produced water which releases steam to the atmosphere and concentrates the salts in the residual fluid. Handling produced water through an evaporative unit is expensive and has several operational problems. However, in some cases it may be the best alternative for an operator.

Cost of an evaporative unit depends on the size: approximate costs are: 20 barrels of water per day (BWPD) unit—$5,000; 50 BWPD unit—$8,000; 100 BWPD unit—$12,000. Fuel usage and maintenance costs depend on several factors and the following discussion is general in nature. Metering of consumed fuel gas used by evaporative units averages 0.600 MCF to vaporize one barrel of water; at a price of $2.00 per MCF, the fuel cost is $1.20 per barrel of water evaporated.

Operating an evaporative or steamer unit can be very expensive and time consuming. The buildup of mineral deposits on the fire tube and walls of the containing vessel

significantly decreases efficiency and can cause control equipment to malfunction. Solutions to these problems include: 1) A time controlled flushing cycle to remove all or most of the residual fluid; 2) An aeration system to agitate the bottom of the vessel before draining off the residual fluid; 3) A holding tank in which the water is preheated with steam before entry into the evaporating vessel; 4) Dual float control valves to shut down the burner; and 5) A regular washing program to clean the vessel's interior.

Several of the approximately twenty evaporators built and used in the San Juan Basin have malfunctioned, requiring major repair work. Collapsed fire tubes, melted floats, and other disabling events have occurred. Regular inspection and a good maintenance program is clearly necessary.

Total operational cost of evaporative units is estimated to be $2.00 to $3.00 per barrel of water evaporated when capital, maintenance, and fuel expense are considered. For wells with remote locations and water production less than 100 BWPD, preferably less than 20 BWPD, an evaporative unit is probably the most economic choice.

Disposition of the residual fluid is a potential problem because of its high total dissolved solids (TDS). This fluid ranges from 100,000 to 300,000 parts per million TDS at discharge temperature depending on the flushing program. The volume of produced water is reduced approximately 90 percent by the evaporative unit. Trucking the reduced volume of residual fluid to a disposal site is more efficient; however the solid-mineral precipitates may require special handling.

ARTIFICIAL LIFT

Most Fruitland coal-bed methane wells are not capable of continuous fluid flow, resulting in the need for some type of artificial lift. Methods currently employed include sucker-rod pumps, cavity-type pumps, and gas lift systems.

These artificial-lift methods are discussed primarily from an operational point of view. Limited data prevents an analysis of the average lifting cost of each method.

Pump Jack

The most common lift equipment is a sucker-rod pump with pumping units of 160, 300, and 640 size (peak torque rating) and 64- to 200-inch stroke lengths. Water productivity knowledge or estimates are necessary to configure a pumping system capable of pulling down the fluid level to the Fruitland. A ring type plunger pump, with a tolerance for solids, placed in the tubing at or below the producing formation has proven cost effective by minimizing plunger wear and maximizing sustained pumping. A sloppy pump with undersized pump rings results in a tolerance for solids without significantly decreasing efficiency. A fairly common assembly would be a stainless steel plunger with undersized plasic rings.

Some accommodation for gas locking through a gas anchor, charger valve, or equalizer valve may be necessary along with proper pump spacing. The size of the plunger depends upon the water volumes. Common sizes are 1.75- or 2.0-inch plungers. Ring-type plunger pumps with properly sized pumping units and sufficient stroke are capable of pumping 2,500 BWPD. More common are units capable of pumping 600 BWPD or less.

Fruitland coal wells equipped for sucker-rod pumping have a somewhat established workover pattern. Wells in the early phase of production need workovers for problems related to abrasion caused by sand and coal fines working on plungers, barrels, and valves. It is fairly common for pumping coal-gas wells to have two or more workovers in the first year.

In the later phase of more stable production (when the gas/water ratio has increased) workovers are more typical of gas wells. These workovers usually involve rod and

tubing wear and more pump repair due to abrasion. Long-term problems such as scaling, corrosion, and rod and pump wear, mark the final phase of production; usually when the coal-gas wells are significantly dewatered. The use of sloppy pumps with cased completions has proven effective in minimizing workover frequency as have gravel packs and certain types of liners in open-hole completions. However, high volume producers might expect two workovers in the first year and one workover every two years after that for the first five years of well life.

Cavity Type Pumps

As an alternative to sucker-rod pumping, the progressive-cavity pump is currently being field tested on several Fruitland coal-gas wells. These pumps are highly tolerant of solids, and the turning of the rods in the tubing usually does not create excessive tubing wear. However, in the presence of high volumes of gassy fluid and deviated holes, tubing and pump wear can be excessive.

Under normal operating conditions, the ring-type plunger pump and the progressive-cavity pump are very comparable. Initial cost of a progressive pump system is significantly cheaper, approximately 70 percent of the cost of a beam-pumping unit for a well 3,000 feet deep. The rotor turning within the stator in a progressive-cavity pump, especially where high gas volumes are present, can create too much friction causing stator burnout and (or) excessive pump wear. Careful placement of the pump below the perforations or the deepest coal zone may reduce the problem.

Changing the rotation frequency of the rod string allows the cavity pump to handle a wide range of fluid volumes. Power failure, either electric or gas engine, can cause the coal fines in the tubing to settle and perhaps lock up the rotor. Some operators use a standing valve on the bottom of the tubing to prevent the liquid from falling back.

As more experience is gained with progressive-cavity pumps, they could become as popular as pump-jack systems on water-producing Fruitland coal-gas wells. If electricity is readily available the progressive pump system should be evaluated.

Gas Lift

Though not as popular as pump jacks, gas-lift systems are currently in operation on several Fruitland coal-gas wells in the San Juan Basin. Most of these installations are single-well systems where produced gas is recirculated to keep the well flowing. Conventional gas-lift systems usually involve a packer and gas-lift valves installed on the tubing.

"Poor boy" gas lift eliminates the gas-lift valves and packer. Compressed gas flows into the casing annulus, and then enters the bottom of the open ended tubing, to help the formation gas lift the water to the surface. This approach works fairly well on strong wells which are capable of unloading themselves. For the marginal wells, unloading by swabbing may be necessary to establish continuous flow. Operational problems with the compressor or other production equipment may cause the well flow to stop. This possibly is the biggest disadvantage of the poor boy approach.

A fluid-filled well can be unloaded with a packer and as lift valves and a suitable compressor. However, a temporary gas supply may be needed. Once steady tubing flow is achieved then either the casing pressure or the flowing tubing pressure is monitored. When the monitored pressure is above the desired level then a motor valve allows the excess or produced gas to flow into the sales line. Maintaining the casing pressure and flow up the tubing is the first duty of the recirculated compressed gas with any excess being sold in a controlled manner.

When dealing with high-volume wells or excessive coal-fine production, it is at times desirable to circulate gas

down the tubing. The larger tubing-casing annulus would be less likely to plug. Another gas-lift technique is the casing-lift system which is based on annular flow. Gas lift valves flow compressed gas from the tubing into the annulus. This would be particularly useful in completions where the coal zones are 100 to 200 feet apart, and a packer above the uppermost perforation is less likely to keep the lower zones producing.

Recirculating gas-lift systems are initially cheaper than a comparable beam-pumping system. There are no pumps to wear out or rods to pull, therefore workover expenses should be significantly less. If gas-lift valves are installed in a well, it is recommended that the bottom valve be wire-line retrievable for maintenance and performance optimization. Most operators need more experience with gas-lift systems to determine the cost effectiveness for use on coal-gas wells.

WATER DISPOSAL

Disposal of produced water is the largest single operational problem and cost encountered in Fruitland coal-bed methane development. Fruitland coal-gas wells in the San Juan Basin produce water in a wide range of amounts; some wells make less than 10 BWPD and a few wells make more than 2,000 BWPD. Coal-gas wells usually produce higher volumes of water initially with water volumes decreasing over time. This diminishing water production results in changing water disposal requirements over well lives. Produced water needs to be handled and disposed of in accordance with relevant Federal, State, and Tribal regulations.

There are many water-disposal methods available and the following is a discussion of evaporative pits and disposal wells. Evaporative units (see Production Equipment section) are in some cases a reasonable disposal technique. Produced water from Fruitland coal-gas wells ranges in composition from fresh to 20,000 parts-per-

million TDS. Coal water contains predominantly sodium bicarbonate which disassociates into sodium and bicarbonate. These compounds form scale and can create land use problems.

Evaporative Pits

Initial coal-water disposal efforts in the San Juan Basin centered on evaporative pits sized to handle produced volumes of several wells based on the evaporation rate with seasonal storage adjustments. Historically, a 1- to 2-acre pit is capable of handling several hundred to approximately 1,000 barrels of water per day with year round evaporation.

The cost of an evaporative pit including purchase of surface lands as well as a construction and liner costs totals approximately $50,000. Significant operating problems of vandalism, hydrogen sulfide gas pollution, and leakage have occurred. Fencing, bacteriacide treatment, and monitoring can lessen these daily operating problems. When an evaporation pit is abandoned, the concentrated brine and scale require special handling.

Disposal Wells

Disposal wells are an attractive alternative to surface pits in that they minimize vandalism, hydrogen sulfide problems, and do not require large surface-area ownership. Additionally, depending upon the receiving formation, disposal-well capabilities usually far exceed produced water volumes and can continuously operate without seasonal fluctuations. However, disposal wells can cost as much or more than a producing well, depending on the depth and need for stimulation.

Water-disposal wells have been completed in many formations from the Tertiary Ojo Alamo Sandstone down to the Jurrasic Entrada Sandstone. Existing wells in the San Juan Basin are injecting water into the Ojo Alamo Sandstone, Pictured Cliffs Sandstone, Mesaverde Group,

Morrison Formation and Entrada Sandstone. Capacities range from 500 to 600 BWPD at 600 psig into the Ojo Alamo, to over 10,000 BWPD at 2,500 psig with a cumulative volume of approximately 1,000,000 barrels of water into the Entrada. The tendency of these wells to pressure up over time may be a function of the plugging from fines resulting in decreasing capacity.

Disposal wells must meet mechanical and quality criteria administered either by the Environmental Protection Agency (EPA) or its administering agency within a state. Quality criteria may make certain zones unsuitable for injection because of water incompatibility or the disposal zone's inability to take large volumes of water. Administratively and mechanically the disposal well route may be difficult to pursue, however, it may be the best solution for high-volume disposal.

Disposal into shallow zones such as the Ojo Alamo Sandstone or Farmington Sandstone Member of the Kirtland Shale may be restricted by quality-criteria problems or limited capacities. Although usually capable of accepting high water volumes, deep disposal wells into the Entrada Sandstone are wildcat in nature and are very expensive to drill and complete. Less-deep zones of the Pictured Cliffs sandstone and Mesaverde Group will meet quality and capacity requirements for most operators and may be the most cost effective disposal zones provided these zones are not capable of commercial hydrocarbon production. Stimulation of these shallower zones will usually improve daily capacity at minimal cost.

ENGINEERING CHALLENGES

Determining the best procedures to develop Fruitland coal-bed methane wells is a challenge we all face. Clearly, the Fruitland coals contain a tremendous gas resource and through diligent work the people involved will be able to establish optimum reserves. Both the operators and regu-

latory agencies need to make difficult decisions with limited information to establish proper Fruitland coal-gas development. Two of the challenges are formation identification and well spacing.

Formation Identification

Determining which pool a well's hydrocarbons are coming from can be a problem in some areas of the San Juan Basin because of the intertonguing of the Fruitland Formation and the Pictured Cliffs Sandstone. In areas where the Pictured Cliffs is not capable of commercial production, or when wells are clearly completed only in the Fruitland coals, then zone identification is not a problem. However, some wells completed only in the Pictured Cliffs sandstones, can produce gas having a strong coal-bed methane signature. This could be the result of the stimulation treatment not staying in the intended zone. In other wells there appears to be production of a mixture of coal-bed and sandstone-reservoir gas and water.

Effective reservoir management is difficult in these mixed cases. To be able to keep meaningful production records, correct formation identification is necessary. Pools such as the Los Pinos Fruitland-Pictured Cliffs, South, in northern New Mexico, which are handled as down-hole commingled pool, need to be reevaluated and perhaps redefined.

In some areas of the San Juan Basin, one possible scenario would be for an operator to drill to a specified depth; complete and test the well; and finally present to the regulating agency, information which identifies the well as capable of producing from the Fruitland or the Pictured Cliffs or both. Well spacing and zone identification are integral matters which must be addressed harmoniously to insure the best development.

Well Spacing

Because of the site specific nature of Fruitland permeability, spacing should be flexible enough to allow

down-spacing in the less permeable areas. Spacing-units of 320 acres would appear to be the largest that would not penalize most operators and still allow prudent development in non-unit situations. Unitized operations could include owner-agreements regarding well spacing perhaps as large as 640 acres without penalizing any mineral owner. This large spacing is not reasonable for prudent development of non-unitized lands.

The directional-permeability phenomenon in coal also suggests larger drill-site-spacing blocks; 320 acre-blocks are desirable, with downsizing allowed. The ultimate number of wells will depend upon economic recovery of the maximum amount of gas at minimum cost. The engineering challenge will be to use geologic and engineering data to locate wells in irregular patterns dictated by permeability zones, which vary. Perhaps these zones are influenced by the cleat system and they may change from well to well in a dynamic situation. These factors will require an understanding of the direction and extent of permeability in a field area concurrent with development.

CONCLUSIONS

Completion and operation of Fruitland coal-gas wells begins with a single decision; to drill and complete the well to minimize damage or to drill and complete the well to maximize control and then repair the damage done. An open-hole completion assumes a larger hole, gravel pack or liners, less controlled stimulation, if at all, production of coal fines, and a high incidence of clean-out and other workovers. Pumps and production equipment must be capable of handling the coal fines. Cased completions assume a smaller hole, perforations, controlled stimulations to bypass formation damage, minimal fines production, and limited clean-out and repair workovers.

The use of produced water as a drilling fluid is popular in both cased- and open-hole completions because of low

cost and no damage to the formation. Regardless of completion type, the engineering challenge is to find the best production equipment and operating procedures for each well. Large separators and filtration units are necessary to handle the produced coal fines. Usually there are large volumes of produced water which should be properly disposed of at the cheapest price. Water disposal methods include evaporative units, evaporative pits, and disposal wells. With future Fruitland coal-bed methane development, the need for water disposal will increase and this issue will receive more attention and regulation by State and Federal agencies.

Technical Report

Coal Composition, as Related to the Mode of Occurrence of "Coalbed Methane"

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November 9, 1992

WHAT IS COAL?

Definitions of Coal

The term "coal" is loosely applied to a diverse class of organic matter-rich sedimentary materials and can be defined in a variety of ways—stratigraphically, petrographically, geochemically, or otherwise—depending on the context in which it is being considered. Coal eludes a precise definition, even from a scientific perspective, owing largely to its complex and highly variable nature. In spite of any differences among them, however, most published definitions of coal include three unifying elements: 1) coal is a type of sedimentary rock, 2) coal is comprised primarily of carbonaceous material, and 3) coal is readily combustible. Beyond this, coal composition can be quite complex and variable. In the end, coal can be satisfactorily defined only through a detailed description of its composition and structure.

A particular functional definition of coal appears in the American Geological Institute's *Dictionary of Geological Terms* (Bates and Jackson, 1980). This definition is adapted from the definition(s) originally developed by Dr. James M. Schopf of the U.S. Geologic Survey (Schopf, 1956, 1966):

> coal—a readily combustible rock containing more than 50% by weight and more than 70% by volume carbonaceous material, including inherent moisture, formed from compaction and induration of variously altered plant remains similar to those in peat. Differences in kinds of plant materials (type), in the degree of metamorphism (rank), and in the range of impurity (grade) are used in classification.

Important facets of this definition are: 1) There are many different varieties of coal. These may be described and classified according to their type, rank, and grade. 2) Mineral matter is a constituent of coal. Mineral matter content provides the criterion for distinguishing coal from all other types of sedimentary rocks. 3) Coal includes "inherent moisture".

Consistent with this definition, the American Society for Testing and Materials, which establishes North American standards for testing and classifying materials, defines coal as (ASTM, 1991, D-2796-88) "a brown to black combustible sedimentary rock (in the geological sense) composed principally of consolidated and chemically altered plant remains." As a footnote, the definition goes on to state that "coals exhibit a wide range of properties due to differences in the kinds and relative amounts of different plant materials and intermixed mineral matter, the amount of alteration of the plant remains achieved before burial, and especially the degree of physical and chemical alteration after burial . . . The moisture content and the kind, amount, and mode of occurrence of mineral matter also vary greatly." Once again, mineral matter and moisture are specifically identified as constituents of coal. There are no restrictions made as to the composition of the organic constituents of coal.

Mineral matter is a constituent of coal. Although ASTM does not stipulate a maximum mineral matter content for coal, the ASTM definition for "impure coal" (ASTM, 1991, D-2796-88) is "coal having 25 weight % or more, but less than 50 weight %, of ash on the dry basis." As a footnote, the definition goes on to say that "[sedimentary] material . . . having more than 50 weight % ash is properly called coal or carbonaceous shale or siltstone." By implication, the terms coal or impure coal apply only to rocks that yield less than 50 weight % ash. Although many sandstones, shales, or limestones are free of organic components, no coal is entirely free of mineral components. Mineral matter is an integral component of all coals. Although the term "coal" has occasionally been

used to refer solely to the organic fraction of the rock, this usage is inconsistent with U.S. and international standard terminology. Coal containing a large proportion of mineral constituents may be referred to as "impure" coal, "dirty" coal, or "high-ash" coal.

Various minor and trace elements found in coal occur not as minerals, but actually bonded to the organic structure of the coal (Jenkins and Walker, 1978), partly as organic complexes. For examples, detailed study of uraniferous lignite and uranium-bearing coals of the western United States has shown that in some cases, uranium-bearing minerals are present, but that in many other occurrences, "uranium, although not present as a distinct mineral, is closely associated with the organic carbonaceous material" (Denson et al., 1959). Other trace elements in coal having strong "organic affinities" in Western U.S. coals are barium, magnestium, bromine, strontium, beryllium, phosphorus, sodium, and calcium (Palmer, 1983).

"Inherent moisture" is a constituent of coal. For purposes of mining and commerce, water is routinely considered to be a constituent of coal. Federal guidelines published by the Office of Surface Mining (a division of the U.S. Department of Interior) stipulate that tonnages of coal mined and shipped must be calculated with respect to "inherent moisture" content. These regulations define inherent moisture as "moisture that exists as an integral part of the coal seam in its natural state, including water in pores but not that present in macroscopically visible fractures" (emphasis added). Careful past studies have demonstrated that *in situ* moisture contents are very accurately estimated by the Equilibrium Moisture test (Rees et al., 1939). Therefore, this is the test mandated in the OSM regulations as a measure of inherent moisture content. This is also consistent with the definition of coal discussed previously (Bates and Jackson, 1980) which specifically regards moisture as a constituent of coal.

ASTM also regards moisture as an inherent component of coal. According to the ASTM rank classificaiton system, at ranks up to and including high volatile A bituminous, coal classification is done on the basis of BTU yield on a moisture-containing basis (ASTM, 1991, D-388), where moisture content is, once again, determined via the Equilibrium Moisture test (ASTM, 1991, D-1412).

Coal is a "Mixture" of Constituents

As stated by Green et al. (1982), "coal is a composite material consisting of a huge variety of coalified vegetative remnants into which are also mixed various inorganic minerals components." Essentially, coal is a heterogeneous mixture of constituents. The significance of the term "mixture" cannot be overemphasized, as it provides one of the keys to understanding coal composition and structure. In a chemical sense, a "mixture" refers to any combination of two or more substances that are not chemically bound to each other. The term "chemically bound" refers to relatively strong bonds (typically "covalent" or "ionic" bonds) where electrons are shared between adjacent pairs of atoms. A large proportion of the atoms comprising coal are bound together in this way; but on a slightly larger scale, coal represents an intermixture of constituents which are not strongly bonded to one another, but are merely physically intermixed with one another. In addition, there are a variety of weak intermolecular forces, such as "hydrogen bonds" and "van der Waals bonds" that help to hold together as a coherent mass, but these forces are much weaker than covalent bonds.

Some Keys to Understanding Coal Composition

- The term "coal" does not refer to a specific compound, but to a diverse class of sedimentary rocks comprised mostly of organic matter.

- Coal is not a pure compound, but a heterogeneous mixture of different constituents. Compositional heterogeneity occurs at many different scales, from centimeter-scale banding, visible to the unaided eye, to different types of molecules.
- Mineral matter is a natural constituent of all coals, the relative proportion of which is an important parameter of coal composition.
- Water and methane are natural constituents of all coals, the relative concentration of which are important parameters influencing economic value of the coal.
- Coal composition is not constant, but undergoes a continual evolution during its history in response to changing conditions of temperature, pressure, and chemical environment.
- Oil-like and gas-like substances form in coal as natural by-products of coalification. These by-products are partly retained within the coal structure and partly expelled into surrounding strata. The retained portion becomes part of the so-called "molecular fraction" of coal. The expelled portion become oil and gas *sensu stricto*.
- On a molecular scale, coal constitutes a loose aggregation of molecules of varying size and complexity, bound together by several different types of forces, including: covalent bonds (strong), hydrogen bonds (weak), and van der Waals bonds (very weak).

In considering coal as a heterogeneous "mixture" of ingredients, the components of coal can be investigated and classified on several distinct scales of view. At the millimeter scale (10^{-3} m), coal is comprised as a mixture of interbedded "lithotypes." At the micron scale (10^{-6} m), coal is comprised of a mixture of "macerals"; and at the

submicroscopic nanometer scale (10^{-9} m) coal is comprised of an intertangled network of organic molecules, plus other components.

Coal is analogous to concrete in its microscopic structure. When originally deposited, peats (the precursors of coal) comprise loosely compacted masses of vegetal remains. The vegetal remains are not bound together (although they may be intertangled), and the peat may be broken up by hand. During the coalification process, however, the woody material becomes partly solubilized and gelified. At higher rank, in response to increased temperatures and pressures, this gel dehydrates, and the coal develops a physical coherency. The gelified material, which will become vitrinite, functions as the "glue" which binds the coal together, in much the same manner as cement binds concrete together. The liptinite and inertinite macerals and mineral grains function in a similar manner to gravel in concrete lending strength to the mixture. Although all of the macerals and minerals are consolidated in this way into a more-or-less coherent mass, the macerals and minerals tend to maintain their distinct identity and morphology.

The great variety of organic constituents in coal reflect: 1) variability of the biological materials (plants and micro-organisms) and minerals initially contributing to the coal deposit and 2) mechanical and (bio-)chemical changes occurring shortly after deposition. Both factors have varied significantly through geologic time and in response to differences in climatic setting and depositional regime. These differences have produced coal deposits having greatly differing chemical composition and physical properties, yet the single term "coal" encompasses all these many varieties of materials.

The Molecular Constituents Of Coal

Although the fundamental characteristics of coal molecular structure have been known for some time (Van

Krevelen, 1961), research conducted over the past two decades has provided a considerably more detailed picture of coal structure. Older views depicted coal as a three-dimensional polymeric structure interconnected by a network of bridge structures and cross-linkages (Davidson, 1982; Given, 1984; Behar and Vandenbrouke, 1987). This type of model emphasized the role of strong covalent bonds. The polymeric model for coal is still basically valid, but it is now generally recognized that a diverse suite of "smaller"[1] molecules is entrapped within this three dimensional structure, ranging in size and complexity from CH_4, CO_2, and H_2O at the low end to higher molecular weight aromatic substances, including oils, tars, and asphaltenes, at the upper end.

Strong covalent bonds are much less important in binding this mass together than was previously imagined (Brown and Waters, 1966; Green et al., 1982; Larsen and Wei, 1988). Instead, weaker intermolecular forces, including hydrogen bonding and van der Waals bonding are important. This model is best described as a "two-phase" system, comprising a three-dimensional, covalently bonded "macromolecular matrix", plus an entrapped "molecular fraction"[2] (Vahrman, 1972: Davidson, 1982;

[1] There is potentially some confusion in the terminology here relating to size of these entrapped molecules, depending on the frame of reference. From the perspective of the "macromolecular" structure of the coal matrix (which is "huge"!), these entrapped molecules are "small". From the perspective of oil and gas, however, some of these entrapped molecules are quite large.

[2] The term "molecular fraction" is more-or-less equivalent to the term "mobile phase", as used in many other recent scientific papers on coal composition (e.g., Given, 1984; Given et al., 1986: Derbyshire et al., 1989). The term mobile phase is avoided here, however, because it is somewhat misleading. Most of the molecules comprising the mobile phase do not truly form a distinct phase, but dispersed throughout the macromolecular matrix. Nor are the bulk of these molecules truly mobile in the strict sense. Most are entwined, entrapped, or loosely bonded to the coal structure and can be

Given, 1984; Given et al., 1986; Derbyshire et al., 1989; Herod et al., 1991).

A conceptual representation of the two-component model of coal composition is depicted in Fig. 1. Here, the initial subdivision is between organic and inorganic constituents. The organic fraction is further divided into a macromolecular matrix fraction and an (entrapped' molecular fraction. The molecular fraction is further subdivided into two classes: 1) a tightly bound portion, comprised of free molecules that cannot readily migrate through the coal structure, owing to their size, shape, or the cumulative strength of bonding with the matrix, and 2) a "loosely bound" portion, comprised of smaller molecules that can migrate with comparative ease into or out of the coal structure. In this latter category are methane, carbon dioxide, and water, among others. Of these, methane is of particular economic significance as it represents the predominant contributor to the gases produced from coal.

The specific procedure(s) used to distinguish these two classes of coal constituents is not specified in Figure 1, since a wide variety of methods may be used, each one yielding somewhat different results (e.g. vacuum distillation, thermal treatment, solvent extraction, or ^{1}H-NMR spectroscopy). The unifying concept of all such analyses is to differentiate a fraction of coal that is relatively loosely bonded to the coal structure (molecular component) from a fraction that is more strongly bound and, therefore, more resistant to removal by thermal treatment or by solvents (macromolecular matrix component).

freed only by substantially swelling or breaking down the coal structure, as for example, with pyridine. The "mobility" alluded on the term refers to ability to vribate in a high frequency magnetic field (Given, 1984).

Fig. 1—Conceptual classes of coal constituents, including matrix and molecular fractions (Levine, in press). Methane belongs to the loosely bound molecular fraction. [omitted]

According to current state of knowledge, there is little fundamental difference between the manner that the larger molecules are associated with the coal structure and the manner that the smaller molecules are associated with the coal structure. Neither class is covalently bonded, but only the smaller molecules can be readily removed. The larger molecules tend to remain bonded or physically entangled in the network unless acted upon by thermal or strong solvent extraction methods.

The two-component model of coal composition has been proposed in various forms since around the turn of the century (Given, 1984), but has recently gained broad acceptance as providing a structural model that is both realistic and useful in explaining coal behavior. The two-component model provides the key to understanding the evolution of the physical and chemical characteristics of coal during coalification. Virtually every measurable property of coal is best understood in light of this model, including gas sorption capacity, optical properties, liquefaction behavior, and coking characteristics (Green et al., 1982).

It must be borne in mind that neither the molecular component nor the macromolecular matrix component is homogeneous or pure. Moreover, their composition changes significantly during coalification. For example, at low rank the molecular component is dominated by water, at medium rank by oils, tars, and asphaltic materials, and at high rank by methane and water, but there is always a diverse mixture of species present.

Molecular constituents comprise as much as 30-75% of coal, by weight. Estimates of the weight percentage of

molecular fraction present in coal are variable and somewhat uncertain, depending on the analytical method used (Given et al., 1986 and Derbyshire et al., 1989). Moisture contents (which are less ambiguous) decrease dramatically from over 75% in peat to as little as 1% (or less) in high volatile A bituminous coals (Fig. 2). The percentage of organic constitutents removable by solvent extraction is more uncertain, however, and may vary widely for any given coal depending upon the solvent system used. Pyridine extract yields are believed to provide the best estimate of the entrapped molecular fraction (Larsen and Wei, 1988). Pyridine extractables reach a maximum concentration of around 25-35% at around high volatile A bituminous coals, then decrease once again at higher ranks (Van Krevelen, 1961). Fruitland coals underlying much of the Southern Ute Indian reservation are of high volatile A bituminous rank. Beyond this peak, pyridine yields drop to near zero at anthracite rank, but accompanying this change, the accessibility of smaller molecules such as water and methane increases once again, indicating a reopening of the molecular structure. Thus, at all ranks, loosely bonded molecules comprise a substantial proportion of the total weight of the coal.

Water is part of the molecular fraction of coal. Water is sometimes not viewed as a bona fide constituent of coal since it is so readily removed. Nevertheless, inherent moisture shares the same sort of interrelationship (especially involving hydrogen bonding) with coal structure as other so-called "organic" molecular constituents. When moisture is removed, the coal structure collapses and shrinks, and all measurable physical and chemical properties change (Ode, 1963; Green et al., 1982). In high rank coals, changes associated with dehydration are reversible by resaturating the coal with moisture (Stansfield and Gilbart, 1932; Rees et al., 1939) but at low rank they are partly irreversible (Selvig and Ode, 1953). This

irreversibility is apparently related to collapse of the molecular structure and information of new intermolecular bonds within the non-hydrated fraction. Indeed, moisture provides part of the binding forces that helps to hold coal together. When moisture is removed, most low rank coals shrink and crack visibily, and become weak and friable.

"Oil" is part of the molecular fraction of coal. Oil is a naturally occurring earth material comprised of hydrocarbons and related substances that occur in a predominantly liquid state and are mostly soluble in common organic solvents, but are insoluble in water. In contrast, coal is largely insoluble in such solvents as carbon disulfide, carbon tetrachloride, and dichloromethane (methylene chloride). This insolubility led to the concept of coal have a much more complex polymeric structure than oil (Van Krevelen, 1961). It is now widely recognized, however, that coals in the bituminous rank range contain a substantial proportion of solvent extractable constituents that are very oil-like in composition (Vahrman, 1972; Herod et al., 1991). The difficulty in solubilizing these components of coal is now understood to be due to the rigidity of the macromolecular matrix (Green et al., 1982). In the presence of a solvent that relaxes and expands the macromolecular matrix (such as pyridine), a much larger proportion of entrapped molecules can be freed. Many (although not all) of the pyridine extractable materials are common constituents of petroleum, while others are higher molecular weight materials that are more properly termed tars or asphaltic substances (Vahrman, 1972; Herod et al., 1991).

Thermal distillation procedures, such as Rock-Eval pyrolysis can also liberate a small but significant proportion of entrapped oils from coal (Durand and Paratte, 1983; Teichmuller and Durand, 1983). Figure 3 depicts the gas chromatographic analysis of a thermal extract from a Fruitland coal from the Southern Ute Indian reservation. For this analysis, the sample was held at 300°C sufficient time to volatilize those constituents having boiling points lower than this temperature. (This temperature is considered too low to cause thermal breakdown of the macromolecular matrix). The composition of thermal extract looks very much like a crude oil in its composition, although after a couple of years at the surface most of the low molecular weight "light ends" had apparently either escaped or deteriorated from this sample, or were never present.

Table 2 represents data on the composition of the extractable materials removed from coal by methylene chloride. Here, a detailed chromatographic analysis was not performed, but extractables were classified into several broad categories by liquid chromatography. The properties of "oily" constituents removed was around 0.5-1%, of which around 10-15% were n-alkanes, 40-45% aromatics, 20-30% NSOs, and 15-30% asphaltenes.

Over the past five years or so there has been a large volume of papers published on the oil content and oil generative potential of coals. Much of this work has been done from the standpoint of assessing coal as a "source rock" for oil and gas. (This topic is discussed in additional detail in the section on the "origin" of coal and coalbed methane.) The important conclusion of this work from the standpoint of coal bed reservoirs is that coal generates not just methane as a by-product of coalification but a diverse suite of petroleum, tar, and asphaltic materials. These substances remain entrapped for the most part within the coal structure and substantially influence the coals affinity for other small molecular substances such as water and methane.

Methane is part of the molecular fraction of coal. Methane exhibits a similar relationship to coal structure as water, oil, and other components of the molecular fraction. All of these substances occur as molecules that

are not covalently bonded, but are weakly bonded to or entrapped within the coal structure. The polar forces that bind water to the coal structure are much stronger than the weak Van der Waals bonding that holds methane in place. Also, water can bond to itself, owing to its strong dipole moment. As a consequence, water is typically present in coal in much higher concentrations than methane, particularly at low ranks. Nevertheless, water, methane, and oil "compete" with one another for accessibility within the coal structure (as discussed subsequently, in the section on sorption isotherms). To be fully understood, all the molecular components of coal must be regarded as part of a complex multi-component system. Methane is typically not specifically mentioned in most studies of coal extract chemistry; but this is primarily because most of it has escaped from the coal structure prior to analysis, along with water and other readily-removed constituents. From the standpoint of coal chemistry and structure, however, there are no clear criteria for segregating methane from other molecular constituents of coal. This distinction becomes significant only when the coal is subject to "extraction" methods that preferentially remove the methane.

Fig. 2—Compositional evolution of the molecular fraction of coal during coalification. At low ranks, water is the dominant species. At medium rank, occluded hydrocarbons and asphaltic materials are the dominant species. Methane is present at all ranks, but in quantities to small to depict on this diagram. The prominent hydrocarbon peak at medium rank is the "oil window", representing the rank range over which oil is formed, then subsequently destroyed by thermal processes. [Chart omitted.]

Fig. 3—Gas chromatogram of thermal extract (300 °C) for Fruitland Formation coal, Southern Ute Indian Reservation. [Chart omitted.]

Table 2. Compositions of Rock-Eval and Methylene Chloride Extracts. Fruitland coals. Southern Ute Indian Reservation. [Table omitted.]

WHAT IS COALBED METHANE?

Background

Underground coal seams throughout the world contain an enormous quantity of methane (CH_4) and other light hydrocarbon substances occluded within their molecular structure. ("Occluded" is a term in chemistry meaning adsorbed or absorbed in great quantity.) A variety of other small molecular species are also present in coal, such as carbon dioxide (CO_2), nitrogen (N_2) and water (H_2O). For hundreds of years, the presence of these substances was manifested principally through their (unavoidable) release and discharge into underground coal mine workings, where they can pose a serious safety hazard. Methane, when liberated into the coal mine atmosphere, is the principal constituent of "firedamp" (a traditional miners term for combustible mine gases), and is explosive when mixed with air in proportions from 5 to 35% [3]. Another hazardous mine gas, termed "blackdamp", is comprised of carbon dioxide, which can cause asphyxiation if present in sufficient concentrations.

In order to reduce the safety hazards during mining, these gases are diluted to a fraction of 1% concentration with large volumes of air, which is drawn into the mines by fans, then vented to the atmosphere. Over the past two decades, however, new technologies have been developed which enable hydrocarbon gases to be recovered from coal seams in sufficient quantities and with sufficient purity to permit their use as a pipeline-quality gas. Such coal seam gas recovery methods have been successfully undertaken in association with active mining operations

[3] Less than 5%, there is not enough methane to sustain combustion; greater than 35%, there is not enough oxygen. 9% methane in air is the "stoichiometric" ratio for complete combustion.

before, during, and after mining as well as in "virgin" coal seams where no active mining has yet taken place. It is the goal of commercial coal seam degasification projects to produce gas at rates and volumes that render it economically competitive with other more "conventional" sources of natural gas. When coal degasification is done in conjunction with underground mining, however, additional economic incentives may come via reduced ventilation costs, reduced explosion hazard, and reduced equipment down-time. A further incentive for degasification in advance of mining is the reduced contribution of mine methane emissions to the so-called "greenhouse" gases in the atmosphere.

The term "coalbed methane" is somewhat ambiguous in that it is used in two ways. The first is a purely operational definition, where coalbed methane refers to [any] natural gas produced from coal seams. In this sense, the term coalbed methane does not refer to a particular type or composition of gas, but rather to the fact that it originates from a coal bed. The term arose because coal bed gases are typically very rich in methane (as are most natural gases), but a variety of other constituents may be present, including CO_2, N_2, H_2O, C_2H_6, and higher hydrocarbons. In the second sense, "coalbed methane" refers to the specific substance "methane", which is found occluded in high concentrations in most underground coal seams, and which is the principal contributor toward natural gases produced from those coals. In this latter sense, coal bed gas would be considered to be a mixture of "coalbed methane", plus "coalbed ethane", plus "coalbed carbon dioxide", etc.

In fact, the term coalbed methane has been used very loosely in the past, with little consideration given to the fact that many other substances besides methane contribute to the composition of gases liberated from the coal.

How is Coalbed Methane Produced?

Coal contains within its structure a proportion of constituents that can be volatilized by changing the ambient conditions of temperature and pressure[4]. These volatile components can be released either by decreasing the ambient pressure, by increasing the ambient temperature, or a combination of the two. Increasing the temperature aiso increases the rate at which volatile substances are released. Once volatilized, these substances assume the form of a free fluid (either liquid or gas). In this form, they may flow through the coal, assuming that there is a pressure gradient established. (Given a permeable medium, fluids will always flow from high pressure to low.) The gases that are released from coal in this way effectively *become* what is known as "coalbed methane" or "coal bed gas". Prior to their conversion to a gaseous state, they are effectively part of the coal.

The production of natural gas from coal bed reservoirs involves three fundamental elements: 1) drilling and installation of production tubing, 2) completion/stimulation, and 3) pumping. Drilling and installation of production tubing provides an open conduit through which reservoir fluids (typically water plus methane-rich gas) may be conducted to the surface. Completion/stimulation is intended to increase the interface and connectivity between the well bore and the coal bed. This is usually done either by hydraulic fracturing or by "cavitation" method.

Pumping serves two purposes. 1) It maintains a point of low pressure within the coal bed toward which fluids

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[4] A strong distinction is drawn here between the truly "volatile" constituents of coal (H_2O, CH_4, CO_2, etc.) and so-called "volatile matter", which is determined by the ASTM Proximate Analysis (ASTM, 1991, D-3172). ASTM Volatile Matter is released upon heating the coal to 950°C. At such high temperature, the molecular structure of the coal is radically altered and new substances are formed and liberated. In contrast, the volatile constituents alluded to in the present report are not formed *per se*, but are merely released from the coal structure.

will flow and 2) It removes water from the bed so as to allow gases to flow more readily[5]. In their natural state, the fracture networks in San Juan basin coals are usually water-filled. It has been shown, however, that water is essentially absent in some parts of the basin (Decker and Seccombe, 1986; Scott et al., 1991). In either case, when pressure in the bed is reduced, occluded species such as methane migrate out of the microporous coal matrix and into the major fracture network where they join any other fracture-resident fluids already present (Fig. 4). This mixture of fluids is then free to flow down pressure gradient toward the well. For the most part, the gases from coal bed reservoirs don't become migratory until the pressure conditions in the coal bed are altered by drilling, stimulation, pumping. Any water that accumulates the well bore is pumped off and disposed of. The gases are collected, transported, and sold.

Evidence from gas sorption studies suggests that the conduits through which gas molecules pass during diffusion are on the same order of size as the effective diameter of the molecules themselves (ca. 0.5 x 10^{-9} m). Thus, in diffusion, coal behaves as a "molecular sieve", permitting some molecules to pass through its structure, while excluding others. Molecules migrate at different rates, depending on their size, and on the molecular structure of the coal. Methane diffuses readily and higher hydrocarbons more slowly (Sevenster, 1959). Diffusion through coal appears to be an "activated" process, whereby a molecule must surpass a certain minimum activation energy in order to pass through the system (Nandi and Walker, 1966). For this reason, diffusion rates are more rapid at higher temperature, where a larger proportion

[5] There are some coal bed gas wells in the San Juan basin that do not require pumping because they produce essentially no water. These are relatively uncommon, however. Most coal bed wells require that water be pumped off in order to maintain low fluid pressures.

of molecules possess the minimum activation energy required for transport.

"Gas Content" Determinations

One of the principal means of assessing the reservoir potential of any particular coal is through determination of the concentration of occluded gases. This is measured most commonly by recovering a "core sample" by drilling, and quickly placing it in a sealed canister. The quantity of gases liberated during this process is normally termed the "gas content", but is more accurately described by the term "gas yield".

Although the term "gas content" has come into common usage it creates a misleading impression in several respects. The molecular species that are liberated from coal during these tests are not strictly present in the form of a gas, but assume a gaseous state only after diffusing out of the coal miscrostructure. Therefore, the coal does not contain a gas in the strict sense, but rather a component that can become gaseous under certain conditions. Secondly, owing to the effects of activated diffusion (Nandi and Walker, 1975; Sevenster, 1959), the composition and quantity of gases liberated from test cores of coal is dependent upon the experimental conditions at which the tests are run and is to a large degree arbitrary. Traditionally, desorption tests were run at room temperature, and the cores were desorbed to equilibrate with atmospheric pressure (Diamond and Levine, 1981), but these conditions were simply a matter of convenience. Conditions in the reservoir are quite different. When desorption tests are run at reservoir temperatures (ca. 100-120°F for the San Juan basin) desorbed gases are released more quickly and in greater quantities. Also, greater amounts of higher hydrocarbons are liberated (Fig. 5).

Thirdly, because of the inherent slowness of the diffusion process, desorption test procedures can take many months to complete. The term "residual gas" pertains to

potentially volatilizable constituents that remain entrapped within the coal structure even after extended periods (several weeks or months) of desorption (Diamond and Levine, 1981). In one example, a sample of high volatile A coal (Pittsburgh coal bed) has continued to liberate small amounts of methane even after several years of desorption (J. Ulery, U.S. Bureau of Mines, 1991, personal comm.). Deposition rates may be hastened either by heating the specimen to moderate temperatures (ca. 50-120°C), or by grinding the sample up to a fine micron-sized powder in a hermetically sealed ball mill (Diamond and Levine, 1981). The percentage of so-called "residual", or "remaining" gas measured after grinding can be quite significant depending on the coal sample and measurement conditions, and may represent as much as 50% of the total desorbed gases. All coals may be assumed to retain small amounts of methane and other species within their structure days, months, or even years after being subject to surface conditions. The slow, sustained escape of flammable gases poses a substantial safety hazard in silos or in railroad freight cars where coal is stored, as the gases may explode.

Composition of Gases Desorbed from Coal

There are many varieties of coal bed gas. Nevertheless, *most* natural gas from coal beds is comprised mostly of methane—usually in excess of 90% (as is also the case with most "conventional" natural gas). Some coal bed gas is extremely "dry", being comprised of over 98% methane, particularly from high rank coals and in many localities in the eastern U.S.; but coal bed gas can contain in excess of 10% higher hydrocarbons in some localities, particularly in the western U.S. Other commonly occurring components of coal bed gas are CO_2, N_2 and a variable percentage of higher hydrocarbons. In general the BTU yield of most coal bed gas is of pipeline quality, yielding more than 1000 BTU/cf. Normally,

no processing or cleaning is required aside from water separation.

The composition of natural gases desorbed from coal may be determined via desorption tests or from production wells. In the former technique, a sample of coal is recovered from depth below the surface, typically as a core or cuttings, and quickly placed in a hermetically sealed container. The quantity of gases liberated may then be measured. Although desorption tests are commonly used to measure desorbed gas volumes, compositional analysis is not routinely done, owing to the additional expense and nuisance. It has been generally assumed, without proof, that the desorbed gases were comprised of methane. In fact, other substances are liberated during desorption testing.

Another complicating factor is that the composition of desorbed gases changes with time. This is apparently a consequence of the phenomenon of activated diffusion as well as the variable affinity of the coal for different occluded substances. Methane is liberated relatively rapidly, while carbon dioxide and higher hydrocarbons tend to be preferentially retained; consequently, composition changes with time.

An example from the San Juan basin illustrating this variability is provided by a desorption test sample recovered from the GRI #1 observation well, drilled on the Southern Ute Indian reservation (Fig. 5). Here, a diverse suite of gases were liberated with desorption. Methane contents were 60-70% in the initial stages of desorption, but quickly fell to less than 10%. Nitrogen and propane (C_3H_8) were particularly abundant in these samples, but many other gases were desorbed as well.

Production gases. The composition of gases from production wells in the San Juan basin is quite variable. Some parts of the basin produce gases that are quite dry, being comprised of over 98% methane, while some wells

produce gases that are quite "wet"—wherein a waxy condensate at the surface in addition to gas. Some coalbed wells in the San Juan basin actually produce oil. In other areas of the San Juan Basin, CO_2 content of coal bed gas can be greater than 50%, having a very low BTU value.

Figures 6 a & b show a map of the San Juan basin depicting the regional variability in produced gas composition. Gases from the northern and southern portions of the basin tend to be rich in methane. There is, however, a prominent northwest/southeast trending belt that crosses the basin near the Southern Ute Indian Reservation where produced gases contain substantial amounts of higher hydrocarbons. In some wells, higher hydrocarbons account for over 10% of the hydrocarbon production. CO_2 content of production gases and varies regionally.

Fig. 4—Diagram representing the three stages of gas production from coal bed reservoirs. Initially, the fracture network is saturated with water. As gas begins to form, it forms bubbles, but cannot flow until a minimum saturation is reached, then gas flow commences (from Koenig and Bell, 1985).

Fig. 5—Change in desorbed gas composition with time. Coal sample from COAL Site, Southern Ute Indian Reservation (from Mayor et al., 1991). In this sample, methane constituted a relatively small proportion of the total gas, illustrating the misnomer of the term "coalbed methane".

Fig. 6—Regional variability in composition of produced gases from San Juan basin. a) Ratio of methane (C_1) to hydrocarbons C_1 through C_5 (pentane). In some parts of the basin, methane constitutes less than 86% of total hydrocarbon gases. b) Carbon dioxide content sometimes exceeds 10% (from Scott et al., 1991).

Sorption Isotherms

Sorption isotherms are graphs which depict the quantity of methane or other gases that may be accommodated in coal structure under pressure. Sorption isotherms provide important information about the coal bed reservoir. The importance and relevance of sorption isotherms to the present discussion is two-fold: 1) sorption isotherm curves demonstrate quantitatively that far greater amounts of methane (or other gases) are accommodated in coal under pressure than would be possible if the methane were a free gas. This is due to the fact that sorbed within the coal structure (Metcalf et al., 1991), 2) sorption isotherms can be used to quantitively demonstrate the interaction(s) among various components of the molecular fraction of coal. These relationships will be documented in the following discussion.

Methane Sportion Isotherms. For any given coal, methane sorption capacity increases with increasing pressure of the sorbate. This relationship is demonstrated by the methane sorption isotherm depicted in Fig. 7. This curve was measured on a Fruitland coal sample collected at a depth of 3148 ft from GRI Observation Well #1, at the Gas Research Institute's COAL Site (T32N, R10W, Sec. 17), drilled on the Southern Ute Indian Reservation (Mavor et al., 1991). The curve is steep at low pressure, showing that the first sorption sites are readily filled. At higher pressure, the curve flattens out as the coal approaches its maximum saturation. For comparison, the lower line depicts the quantity of methane that would be accommodated as a free gas in a rock having 1% porosity, which is the estimated porosity for this coal under compression (Mavor et al., 1991). According to this estimate, very little of the sorbed gas can be accounted for by absorption into open pores.

Methane Sorption is Influenced by the Presence of Other Sorbates, including Oil and Water. Thomas and Damberger (1976) studied the sorption of gases into coal

structure for coals from the Illinois basin. They explained the regional variability of sorption capacity as relating to the presence or absence of what they termed "low boiling constituents", which formed in the coal as a by-product of coalification. According to this model, the coal micropore structure becomes "plugged" by secondary hydrocarbons formed during maturation. This implies that the oils which formed during coalification, and which remain entrapped within the coal structure along with other coalification by-products, effectively diminish the coal's capacity to sorb gases. Thomas and Damberger tested this hypothesis by thermally extracting the coal. During thermal extraction, anywhere from 4 to 8% of the coal was volatilized, producing a significant increase in surface area.

Thomas and Damberger's study demonstrates that occluded oils and gases effectively "compete" with one another for sorption sites within the coal structure. In fact, the same effect appears to hold for methane as well. This model has been specifically tested for Fruitland coals using samples from the BEA 15-4 well, drilled on the Southern Ute Indian Reservation (Figure 8). The two samples were collected from the same well, within 100 feet of one another, stratigraphically. The rank of the two samples was essentially identical. Nevertheless, the coals differed substantially in the composition of their molecular fraction. The stratigraphically lower coal contained a much higher concentration of waxy oil as revealed by Rock-Eval pyrolysis and solvent (methylene chloride) extract studies (Table 2; Fig. 8b). Accessibility of H_2O and CO_2 to the coal structure was roughly one half that for the less waxy coal. Gas yields from the two coals, measured by desorption testing, showed roughly twice as much gas desorbed from the less waxy coal. Methane sorption capacity was also slightly lower in the waxy coal (Fig. 8). When the two coals were subject to solvent extraction in methylene chloride to remove occluded oil, the sorbate accessibilities of the waxy coal jumped dramatically, indicating that the sites vacated by the extracted material had become accessible to sorption by methane (Fig. 8b).

For any given coal, the capacity for a given gaseous sorbate is diminished by the presence of other gaseous sorbates. It has long been known that water can substantially suppress the methane sorption capacity of coal (Joubert et al., 1974). Recent research at the University of Alabama has demonstrated that the opposite is also true. Methane can reduce the sorption capacity for water. Research conducted at Amoco Production Research laboratories has demonstrated that nitrogen and methane compete for sorption sites in coal (Puri and Yee, 1990; Arri et al., 1992). Competitive sorption behavior of CH_4-CO_2 systems has also been investigated for San Juan basin coals (Olszewski et al., 1992).

While interrelationships are complicated, it is clear that to fully understand sorption behavior, the overall composition of the molecular fraction should be evaluated in its entirety. In other words, it is an inaccurate oversimplification to represent methane as absorbing on a solid porous substrate. The physical reality is that methane is but one component of a complex system.

Fig. 7—Sorption isotherm, measured at 120°F (reservoir temperature), for a coal from the COAL site, Southern Ute Indian Reservation

Fig. 8—Influence of occluded oil in coal on methane sorption capacity for two coal seams from the same core hole, within 100 feet of one another. a) Sorption isotherms for raw and extracted coal; b) Analytical data

IS COALBED METHANE A PART OF COAL?

The short answer to this question is "Yes". This conclusion is based upon information presented throughout this report.

Coal is sometimes regarded as a solid fuel and, of course, gas is gas; but upon closer scrutiny, it becomes apparent that this distinction is fuzzy, and based to some degree on superficial observations. When a sample of coal is removed from the ground or once the conditions in a coal bed are changed, its composition immediately begins to readjust to its new surroundings. Among the processes that are known to occur are: 1) desorption of occluded gases, 2) desiccation (drying), and 3) oxidation. Coals stored in the absence of oxygen will not oxide; and coals stored under water will not dry out; coals stored under methane pressure will not desorb methane. Coals that are kept cold desorb very slowly; and coals that are heated desorb rapidly, and more higher hydrocarbons are released. Thus, the rate and quantity of compositional changes depends entirely on the ambient conditions to which the coal is subjected.

After the coal has re-equilibrated to its new conditions, its composition and physical characteristics will have changed in a slight but measurable way. The coal shrinks slightly during desorption, and substances are lost from the coal structure. This is observed for methane desorption as well as for carbon dioxide, water, etc. If oxidized, oxygen is added to the structure and the weight of the coal increases. As water evaporates from coal, the weight of the coal decreases. The same thing happens during methane desorption, but the weight loss is too small to be of concern for marketing purposes [6]. In the case of water loss, it has been mandated by Federal regulations that the tonnages of mined coal be considered not on an altered, 'as received" basis, but on an "Equilibrium Moisture"-containing basis, which is though to represent *in situ* bed conditions (cf. previous discussion on "Water is part of

[6] Weight loss during methane desorption has been measured directly at the University of Alabama using an electro-microbalance (Levine et al, 1991). Weight changes constitute only a fraction of 1%.

the molecular fraction of coal"). To the author's knowledge, there are no similar regulations that specifically refer to methane, ethane, carbon dioxide and other similar components.

WHAT IS THE ORIGIN OF COAL AND COAL BED GAS?

Beginning with its deposition on the earth's surface and continuing throughout its history, coal undergoes a pro-progressive evolution in composition and structure termed "coalification". Coal "rank" provides a measure of the degree of coalification. The physical and chemical changes associated with coalification largely represent the response of sedimentary organic matter to elevated temperatures and pressures in the depths of the earth. Even though the composition and structure of coal may be radically altered during this process, the single term "coal" encompasses all such materials.

Rank provides the principal basis of the ASTM coal classification system used in the United States and Canada (ASTM, 1991, D-388). The ASTM rank classes begin with lignite and continues with subbituminous, bituminous, semianthracite, anthracite, and meta-anthracite. Coal in the San Juan basin increase in rank from high volatile C bituminous in the southern part of the basin to low volatile bituminous near the northern part of the basin. Although these strata were deposited at nearly the same time geologically, their rank has been increased to varying levels, reflecting differences in their coalification history.

The concept of coal rank is particularly important to coal bed gas reservoirs, as methane and other light hydrocarbons are formed from the coal itself, as by-products of coalification. Also, rank influences the capacity of coal to incorporate methane into its structure.

Chemistry of Coalification. The organic structure of coal are comprised primarily of the elements carbon, hy-

drogen, and oxygen, which are present in a diverse number of molecular structures. The process of coalification is manifested by the progressive enrichment in elemental carbon accompanied by the depletion in hydrogen and oxygen. The theoretical end member of coalification is pure carbon, in the form of graphite (Fig. 9).

To understand the chemistry of coalification, the key question is, "How and in what form are hydrogen and oxygen removed from the coal? The answer is that by-product substances are formed that are rich in hydrogen relative to carbon and oxygen relative to carbon. Examples include (CH_4, with a hydrogen to carbon ratio of 4:1) and carbon dioxide (CO_2, with an oxygen to carbon ratio of (2:1) among many others. For each one of these molecules formed and released, the residual coal becomes enriched in carbon.

For many decades it has been widely recognized that methane is one of principal by-products formed during coalification. More recently, it has been widely recognized that a whole host of other hydrocarbon by-products are formed as well, and that these are completely or partly retained within the coal structure (Lewan, in press).

It is possible to represent the overall process in a simplified fashion as follows:

[By-product Chart Omitted]

The elimination of by products is termed "devolatilization". The composition of these by-products changes with rank. Elimination of water is dominant at low ranks, carbon dioxide at intermediate ranks, and hydrocarbons at higher ranks.

Although devolatilization can successfully account for the changing elemental composition of coal (or coal macerals), it does not represent the overall process of coalification in that it fails to describe the evolution of

the coal molecular structure, particularly with regard to the formation, entrapment, and subsequent destruction of the molecular fraction of coal. The diagram in Figure 10 better describes the overall process. Here the overall composition of the coal is represented by the inner box. Coal composition is subdivided into three classes: mineral constituents, macromolecular matrix, and entrapped molecular constituents, as discussed previously. Processes occurring during coalification are represented by the arrows. These are three main types of coalification reactions, two that are degradative, and one that is constructive: 1) "depolymerization" reactions wherein the macromolecular matrix is broken up into progressively a progressively greater number of pieces, 2) "cracking", wherein the entrapped molecular fraction is broken up into progressively smaller pieces, and 3) polymerization/condensation, wherein components become covalently bonded to form a higher molecular weight product (even though a polymer in the strict sense is not formed). This process is accompanied by the formation of a smaller molecules as a by-product. All three types of the reactions produce smaller molecules as by-products. These by-products are partly retained within the coal and partly released from the coal into the surrounding strata.

The important significance of this scheme to coal bed reservoirs is that the molecular fraction of coal evolves simultaneously with the rest of the coal as part of the overall coalification process. Carbon dioxide, methane and higher hydrocarbons, water, and oil are all formed from the coal itself during coalification. In this manner, coal bed reservoirs serve as their own "source rock"; that is, the hydrocarbons contained within the coal originated within the coal.

As a consequence of processes occurring during coalification, the composition and concentration of the molecular fraction of coal is not static, but changes markedly (Fig. 2). At low rank, water is the principal molecular con-

stituent of coal comprising over 75% of peats, but decreasing to 15-20%. At medium ranks, pyridine-extractable constituents are dominant, including a diverse suite of hydrocarbons and asphaltic materials, including methane. At high rank (from medium volatile bituminous and beyond) repolymerization and cracking produce an overall decrease in the molecular fraction, although methane remains an important constituent.

Fig. 9—Van Krevelen diagram, plotting hydrogen to carbon atomic ratios on the vertical axis and oxygen to carbon atomic ratios on the horizontal axis. Analyses for coals from the San Juan basin are plotted in the crosshatched area. [Diagram omitted.]

Fig. 10—Flow chart depicting the chemical and physical processes occurring during coalification. [Chart omitted.]

WHAT ARE SOME OF THE FUNDAMENTAL DIFFERENCES BETWEEN COAL BED RESERVOIRS AND CONVENTIONAL RESERVOIRS?

The characteristics of coal as a gas "reservoir" differs from conventional hydrocarbon reservoirs in several important respects. Most of these differences have been highlighted in the previous sections, but are briefly reviewed in the following paragraphs as well.

Source Rock/Reservoir Rock Relationship. In the broadest sense, the development of any economic oil and/or gas deposit requires the more-or-less simultaneous evolution of: 1) a source rock stratum from which petroleum is generated, and 2) a reservoir stratum in which petroleum can accumulate and from which it can be profitably extracted. Typically, a stratum having good source rock properties constitutes a poor reservoir, whereas a good reservoir stratum tends to be a poor source rock. In contrast with conventional reservoir systems, however, coal can at the same time serve as both an excellent source and reservoir. Most conventional oil and gas

accumulations are "sourced" by shale beds containing "dispersed" sedimentary organic matter. Typically, the organic matter (OM) concentration in these rocks constitutes only a few weight percent. Coal beds, on the other hand, represent exceptionally thick, rich concentrations of organic source material, attaining a thickness up to tens of meters. As a consequence of the large amounts of OM contained within them, coal beds produce large quantities of hydrocarbon by-products during coalification. A proportion of the hydrocarbons so generated is retained within the coal itself, owing to the high capacity of coal to incorporate oils and gases as an inherent part of its structure. Thus the coal serves as its own source rock.

Trapping Mechanism. In conventional reservoir rocks, hydrocarbon storage capacity is provided in the form of open pores, whose sizes are typically on the order of micrometers to millimeters in dimension and which constitute perhaps 5-20% of the rock by volume. Although coal contains some pores in this size range, the porosity of typical coal bed gas reservoirs is very low—usually less than 5% and sometimes less than 1%[7]; and this porosity is typically occupied by water *in situ*. Most of the requisite "accessibility" to hydrocarbon storage is related to the "open" molecular structure of coal, which provides nanometer-scale interstices in which small molecules can reside. Of particular interest in this regard is methane which, owing to its small size, non-polar character, and low polarizability is relatively free to enter and exit the structure. This capability of coals to accommo-

[7] "Porosity" is difficult to define in the case of coal, where it represents a more-or-less integral part of the coal structure. Typically, porosity is taken to represent the proportion of the coal volume which may be occupied by a penetrating fluid, assuming that the volume of the pores and/or the fluid does not change during the measurement process. No matter how it is defined, however, it is clearly a "different sort of animal" as compared with porosity in conventional reservoir rocks.

date methane into their structure, due in part to the weak, but significant, attractive forces between methane and other coal constituents (primarily by Van der Waals' bonding), gives rise to tremendously high concentrations of methane in coal at moderate reservoir pressures. 'Equivalent' methane porosities (i.e., the imaginary volume that would be occupied by the methane if it were a free gas) can approach 100% for some coals (depending on pressure)! Once again, however, methane sorption capacity is related to the degree of coalification.

Relationship to Water. There is still "lots of room" for methane within in coal structure, even in water-saturated coals. In conventional reservoirs, if there's water in the pores, then there's no gas. Thus, when gas wells in the Ignacio anticline, underlying the Southern Ute Indian reservation "watered out" during the 1960's and 1970's, the operators assumed incorrectly that there was no more gas to be produced.

Likewise, most coal beds are initially saturated with water; and the water must be removed to initiate desorption and gas flow.

Size of Porosity. Petroleum in conventional reservoirs is entrapped in pores of various types that are typically on the order of millimeters in dimension. In contrast, the intramolecular free volume into which sorbates reside in coal are interpreted to be barely larger than the sorbate molecules themselves. To provide a concept of scale: A single methane molecule residing in a 1 millimeter-diameter pore has the same "aspect ratio" as a pin *point* (not a pin head) in a football field; whereas the microporosity in coal is barely larger than the sorbate molecules that reside within it.

Physical State of the "Gas". For the most part, the substances produced as natural gases from coal beds do not occur as free gases in the reservoir, but as occluded, sorbed species, that are much more highly concentrated

at a given pressure than they would be if in a gaseous state.

"Chromatographic Effect". In conventional reservoirs, natural gas occurs for the most part in a gaseous state. Normally, this gas comprises a blend of species which flows through the reservoir as a homogeneous mixture. In coal bed reservoirs, small molecules must diffuse through a tortuous network of organic molecules before entering the fracture network. This process allows for compositional fractionation of gases. Typically methane is the first and fastest to be released, followed by other constituents. This "chromatographic effect" (Wyman, 1984) provides evidence for the intramolecular storage mechanism of the methane, etc.

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No. 98-830

(12)

Supreme Court, U.S.
FILED
MAR 5 1999
CLERK

IN THE
Supreme Court of the United States
OCTOBER TERM, 1998

AMOCO PRODUCTION COMPANY, on behalf of itself and the class it represents,*
Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,

and

BRUCE BABBITT, Secretary of the United States Department of Interior, *et al.*,
Respondents.

On Writ of Certiorari to the United States Court of Appeals for the Tenth Circuit

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WILSON - EPES PRINTING CO., INC. - 789-0096 - WASHINGTON, D.C. 20001

68 pp

QUESTION PRESENTED

Whether, in reserving to the United States "coal" in lands patented under the 1909 and 1910 Coal Lands Acts, 30 U.S.C. §§ 81, 83-85, while passing the surface land and all other minerals (including natural gas) to the patentee, Congress reserved only the solid rock fuel commonly known as "coal," but not natural gas in coal formations.

LIST OF PARTIES AND AFFILIATES

In addition to the parties listed in the caption, the following federal agencies and officials are also respondents: the Department of Interior, and its subordinate agencies Bureau of Indian Affairs; Bureau of Land Management; Minerals Management Service; Kevin Gover, Assistant Secretary, Indian Affairs; Thomas Fry, Acting Director of the Bureau of Land Management; and Thomas Kitsos, Acting Director of the Minerals Management Service.

The following were defendants below but not appellees: Tiffany Gas Company; MarkWest Energy Partners, Ltd.; McKenzie Methane Corporation; SG Interests II, Ltd.; Union Texas Petroleum Corporation; Conoco, Inc.; SG Interests I, Ltd.; BellSouth Corporation Health Care Trust; Pablo Operating Company; Patricia Penrose Schieffer, individually and as Successor Trustee of the Patricia Penrose Schieffer Testamentary Trust; J. Thomas Schieffer, individually and as attorney-in-fact for the Patricia Penrose Schieffer Testamentary Trust; Greta P. Layton Schutt, Mercantile-Safe Deposit & Trust Company, Charles T. Peters, Jacques T. Schlenger, individually and as Co-Trustees of the Donaldson Brown Trust of March 25, 1965; Palo Petroleum, Inc.; and Meridian Oil Inc.

The following were defendants-appellees but are not petitioners: Anthony F. Zarlengo and Emerald San Juan Company, L.P.

Pursuant to Rule 29.6 of the Rules of this Court, Amoco Production Company amends its previous statement and declares that its parent company is BP Amoco Company (whose parent is BP Amoco Corporation), and that it has no subsidiaries that are not wholly owned.

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BRIEF FOR PETITIONERS

OPINIONS BELOW

The panel opinion of the court of appeals is reported at 119 F.3d 816 (Pet. App. 52a-94a), and the opinion of the court of appeals *en banc* modifying the panel opinion in part is reported at 151 F.3d 1251 (Pet. App. 1a-51a). The opinion and order of the district court awarding summary judgment to petitioners is reported at 874 F. Supp. 1142 (Pet. App. 95a-132a).

JURISDICTION

The judgment of the court of appeals *en banc* was entered on July 20, 1998. This Court granted an extension of time within which to file the petition for certiorari to and including November 18, 1998. The petition for certiorari was filed on that date. Certiorari was granted on January 22, 1999. The jurisdiction of this Court is invoked under 28 U.S.C. § 1254(1).

STATUTES INVOLVED

The statutes involved in this case are 30 U.S.C. §§ 81 & 83-85 (Pet. App. 133a-136a).

STATEMENT OF THE CASE

In the Coal Lands Acts of 1909 and 1910 ("1909 and 1910 Acts"), 30 U.S.C. §§ 81 & 83-85, Congress reserved "coal" to the United States in any lands patented thereunder, while passing the surface land and all other minerals (including natural gas) to the patentee. Pursuant to a 1938 transfer from the United States, respondent the Southern Ute Indian Tribe ("Tribe") has equitable title to coal that the United States had reserved under the 1909 and 1910 Acts in lands within the Tribe's reservation boundaries.

In 1991, the Tribe filed suit in the United States District Court for the District of Colorado, claiming that the statutory reservation of "coal" included natural gas found in coal formations. The district court awarded summary judgment to the defendants, ruling that the 1909 and 1910 Acts reserved only the solid rock fuel commonly known as "coal," and not natural gas found in coal formations. A divided court of appeals *en banc* reversed, concluding that the word "coal" in the 1909 and 1910 Acts was ambiguous. Accordingly, the court held that by reserving "coal" Congress also reserved natural gas in coalbeds (but perhaps not the gas that has migrated from coalbeds to adjacent rock strata). Pet. App. 33a & 18a n.8. In this Court, petitioners challenge the court of appeals' contorted interpretation that conflicts with the plain language, history, and purpose of the 1909 and 1910 Acts.

Historical Background. This case has its roots in the settlement of the West and in Congress' efforts at the turn of the century to husband coal to fuel the country's change from an agrarian to an industrial economy. In the second half of the nineteenth century, Congress sought to develop the vast territory west of the Missouri River that maps of the time "forbiddingly referred to as the 'Great American Desert.'" *Leo Sheep Co.* v. *United States*, 440 U.S. 668, 670 (1979). Accordingly, Congress instituted sweeping changes in the administration of public lands. Among other land grants, the federal government granted public lands to those who would build railroads, roads, and canals that would link the West to the East, *id.* at 671-77, and provided free land in fee simple absolute for homesteaders. See, *e.g.*, Homestead Act, ch. 75, 12 Stat. 392 (1862). However, if the Department of Interior classified land as mineral land (*i.e.*, valuable for certain minerals), it "could not be disposed of under the major land-grant statutes," including the homestead laws. *Watt* v. *Western Nuclear, Inc.*, 462 U.S. 36, 47 & n.8 (1983). Lands classified as valuable for coal were considered mineral

lands. *United States* v. *Sweet*, 245 U.S. 563, 566, 572 (1918).

Even though initially it completely exempted mineral lands from the land grant statutes, Congress took steps in the latter half of the nineteenth century to promote their development by abandoning the existing practice of excluding mineral lands from public sale. See *Deffeback* v. *Hawke*, 115 U.S. 392, 401 (1885); Robert W. Swenson, *Legal Aspects of Mineral Resources Exploitation, in* Paul W. Gates, *History of Public Land Development* 699, 706-07 (reprint ed. 1987). In this process, coal was always treated differently from other minerals. *Id.* at 724 & n.181; see also *Western Nuclear*, 462 U.S. at 44 n.5. In 1864 and again in 1873, Congress enacted Coal Lands Acts specifically authorizing private entry onto lands classified by Interior as valuable for coal; those statutes set a maximum limit of 160 acres on individual entry and minimum prices of $10 to $20 per acre. See Act of July 1, 1864, ch. 205, § 1, 13 Stat. 343; Act of March 3, 1873, ch. 279, § 1, 17 Stat. 607. Congress enacted the Mining Law of 1872 to deal with other minerals; that statute authorized the sale of public lands in fee simple to mining claimants at rates of $2.50 to $5.00 per acre. See 30 U.S.C. §§ 26, 29, 30, 37. Oil and gas lands were always disposed of under the Mining Law. *Union Oil Co.* v. *Smith*, 249 U.S. 337, 345-46 (1919). But, regardless of whether land was conveyed under the homestead, coal land, or mining laws, the entryman received fee-simple title to the land, with no reservation of any part of the mineral estate to the United States. See *Western Nuclear*, 462 U.S. at 48-51; *Deffeback*, 115 U.S. at 406.

As reflected in the price of coal lands, coal powered the Industrial Revolution. See Daniel Yergin, *The Prize* 543 (1992) (describing the reign of "King Coal"). At the turn of the twentieth century, however, a "coal famine" struck the West, and concerns arose about the price, supply, and control of the country's primary source of energy. See *Hearings on Coal Lands and Coal-Land Laws of the United States Before the House Comm. on Pub. Lands,*

59th Cong. 11-13 (1907) (testimony of Edgar E. Clark, Interstate Commerce Commissioner) ("*Clark Testimony*"). At the same time, widespread fraud in coal-land administration was uncovered. The Department of Interior had relied largely on affidavits of entrymen as to the mineral or nonmineral character of lands. *Western Nuclear*, 462 U.S. at 48 & n.9; *Clark Testimony*, at 1-3, 17. Unwilling to pay the steep prices for coal lands set in the 1873 Act or abide by the Act's acreage limitations, railroads and other coal interests connived to have individuals falsify affidavits, acquire lands for homesteading, and then turn the land over to the railroads. Carl J. Mayer & George A. Riley, *Public Domain, Private Dominion* 117 (1985). Most of the coal lands that passed into private hands between 1873 and 1906 were not properly patented under the 1873 Coal Lands Act. *Id.; Clark Testimony*, at 6. President Roosevelt responded in 1906 by withdrawing from disposition under the public land laws 64 million acres of land "which the Geological Survey has indicated as containing, or in all probability containing, coal." 41 Cong. Rec. 2615 (1907); *Western Nuclear*, 462 U.S. at 48-49; Swenson, *supra*, at 726-27.

The Coal Lands Acts of 1909 and 1910. Roosevelt's order prompted an outcry from western interests concerned about its impact on settlers. See Swenson, *supra*, at 726-27. It was claimed that large tracts of land had been withdrawn even though the likelihood that they contained actual workable coal was slight. 43 Cong. Rec. 2503 (1909) (statement of Rep. Mondell); *id.* at 2505 (statement of Rep. Marshall). Large numbers of patent entries on suspected coal lands had been suspended. *Id.* at 2503 (statement of Rep. Mondell). Moreover, even homestead entrymen who had entered the land in good faith were forced to prove to the land office that the land was not valuable for coal, and such hearings could cost the entryman as much as $500. *Id.*; H.R. Rep. 60-2019, at 4 (1909). If it were determined after the hearing that the land was in fact valuable for coal, even the good-faith entryman would lose his land and his improvements upon

it. 43 Cong. Rec. 2503 (1909) (statement of Rep. Mondell).

For three years after Roosevelt's order, Congress struggled to reconcile the competing interests of protecting settlers and retaining federal control of coal. Some proposed severing the surface and mineral estates. Roosevelt was a proponent of this course, and he "urged Congress that '[r]ights to the surface of the public land . . . be separated from rights to forests upon and to minerals beneath it, and these should be subject to separate disposal.'" *Western Nuclear*, 462 U.S. at 49 (quoting Special Message to Congress, Jan. 22, 1909, 15 Messages and Papers of the Presidents 7266) (alterations in original). Indeed, a number of bills were introduced (but failed) that would have severed the surface and mineral estates, some of which specifically would have reserved "natural gas" as well as "coal" to the United States.[1]

Compromise was finally struck on the last day of Roosevelt's presidency in the Coal Lands Act of 1909, Act of March 3, 1909, ch. 270, 35 Stat. 844 (codified at 30 U.S.C. § 81) ("1909 Act"). The 1909 Act authorized the issuance of patents to "[a]ny person who has in good faith located, selected, or entered under the nonmineral land laws of the United States any lands which subsequently are classified, claimed, or reported as being valuable for coal," upon proof of compliance with those land laws. 30 U.S.C. § 81. The Act, however, mandated that the patent "shall contain a reservation to the United States of all *coal* in said lands, and the right to prospect for, mine, and remove the same." *Id.* (emphasis added). The Act preserved the right of the patentee to "mine coal for use

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[1] *See* 41 Cong. Rec. 630 (1907) (bill by Rep. Volstead "reserving coal, lignite, petroleum, and natural-gas deposits from disposal . . . under existing land laws"); *id.* at 1483-84 (bill by Sen. LaFollette "reserving from entry and sale the mineral rights to coal and other materials mined for fuel, oil, gas, or asphalt" while providing for sale of the surface lands); *id.* at 1788 (bill by Sen. Nelson "to provide for the reservation of the coal, lignite, oil, and natural gas in the public lands").

on the land for domestic purposes prior to the disposal by the United States of the coal deposit." *Id.*

In debate over the 1909 Act, Representative Mondell of Wyoming, chairman of the House Public Lands Committee, explained that the Act "is the first legislation before Congress providing for a limited patent, or a patent reserving the mineral. It is necessary in the opinion of our committee by reason of the conditions that exist." 43 Cong. Rec. 2504 (1909). The Committee had discussed at length whether to reserve other minerals, Rep. Mondell acknowledged, but it determined that the limited reservation of coal "is quite a sufficient departure from the past practice of the Government" and "as far as we will go in th[e] direction" of issuing limited patents. *Id.*

Although the 1909 Act addressed the rights of persons who had entered coal lands in the past, Congress remained concerned that the prohibitive price of coal lands deterred new settlement. See 45 Cong. Rec. 6042 (1910) (statement of Rep. Mondell). Congress passed in 1910 a parallel Act that authorized patents for new entrymen under nonmineral land laws, and contained an identical reservation of coal to the United States. Act of June 22, 1910, ch. 318, 36 Stat. 583 (codified by section at 30 U.S.C. §§ 83-85) ("1910 Act"). Congress again rejected calls to broaden the reservation to other minerals, including gas.[2] Thus, the 1909 and 1910 Acts reserved only coal to the United States, and then only on those lands classified by the federal government as valuable for coal.

Natural Gas at Issue in this Case. Even though Congress declined to reserve natural gas in the 1909 and 1910 Acts, thus allowing the entire natural gas estate to pass to the patentee, the issue in this case is whether its reservation of "coal" somehow encompasses natural gas found in coalbeds. The meaning of the reservation must be resolved on the basis of the ordinary understanding of

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[2] H.R. Rep. No. 61-377, at 5 (1910) (letter from Secretary of Interior Ballinger); 45 Cong. Rec. 6044 (1910) (statement of Rep. Stephens).

the term "coal" in 1909, see *infra* at 21-22, but nonetheless it may be helpful for the Court to understand basic facts about the minerals at issue. What those facts reveal is that gas that happens to be in a coalbed is no different from any other kind of natural gas.

A. *Coal*

"*Coal* is a readily combustible rock containing more than 50% by weight, and more than 70% by volume, of organic material formed from the compaction or induration of variously altered plant remains." John M. Hunt, *Petroleum Geochemistry & Geology* 124 (2d ed. 1996); American Geological Inst., *Dictionary of Geological Terms* 94 (Robert L. Bates & Julia A. Jackson eds., 3d ed. 1984) (same). See also Jack A. Simon & M.E. Hopkins, *Geology of Coal, in Elements of Practical Coal Mining* 14, 14 (Douglas F. Crickmer & David A. Zeeger eds., 2d ed. 1981) ("Coal is defined as a combustible rock that originated in the accumulation and physical and chemical alteration of vegetation"); Otto Stutzer, *Geology of Coal* 1 (Adolph C. Noé trans., Univ. of Chicago Press 1940) ("Coal is a combustible rock which had its origin in the accumulation and partial decomposition of vegetation") (emphasis omitted).

"In the same way as inorganic rocks are composed of minerals, . . . coal consists of macerals," which are the organic microscopic constituents of coal. E. Stach *et al.*, *Stach's Textbook of Coal Petrology* 87 (3d ed. 1982). Because of the many different factors affecting the origin and formation of a coal seam, however, a coal maceral "varies widely in its chemical composition and physical properties and is not crystalline." *Id.*; see also D. W. Van Krevelen, *Coal* 193 (3d ed. 1993) ("coal is an organic rock, made up of petrographically-homogenous components (macerals) each of which must have formed from an already complex parent material by a complicated chemical reaction process").

Coal is generally formed from massive deposits of terrestrial plant matter in coastal swamp areas, which become buried by sediments as the sea level rises or the land subsides. Stach, *supra*, at 5, 16-17; Simon & Hopkins, *supra*, at 18-20. Bacterial action converts the plant matter into peat. As the peat is buried under more sedimentary layers, it is compacted and is increasingly subject to high temperature and pressure. This process yields coals of increasing carbon content. The four major "ranks" of coals produced in this process are, in order of production and increasing carbon content: lignite (soft brown coal), subbituminous (hard brown coal), bituminous, and anthracite. B.P. Tissot & D.H. Welte, *Petroleum Formation & Occurrence* 234-35 (2d ed. 1984); Stach, *supra*, at 38-43.

The process of producing these coals is known as "coalification," but there is nothing unique about it. Stach, *supra*, at 43. It is the same process of burial, compaction, and geothermal heating of organic matter that occurs in the development of any of the many kinds of carbonaceous materials. Tissot & Welte, *supra*, at 229; Hunt, *supra*, at 208. In chemical terms, organic matter of relatively unstable structure with a high ratio of hydrogen to carbon ("H/C ratio") is transformed into a condensed, stable compound of high carbon content. Hunt, *supra*, at 206-09. This decrease in the H/C ratio is typical of all organic matter (not just coal) as it exposed to increasing temperature over time. *Id.* at 209; Tissot & Welte, *supra*, at 241. As discussed in more detail below, gas is a byproduct of this transformation of organic matter into more stable arrangements; the hydrogen atoms that are released form separate gas molecules, including methane (which is four hydrogen atoms bonded to a single carbon, CH_4). Hunt, *supra*, at 209.

B. *Natural Gas*

Natural gas is the gaseous form of petroleum, *i.e.*, petroleum that does not condense at standard atmospheric temperature and pressure conditions. Hunt, *supra*,

at 23.[3] Natural gas is composed principally of the hydrocarbon gas methane, but (depending on its source and the conditions of its formation and accumulation) may contain varying amounts of other gases. Tissot & Welte, *supra*, at 199. The major forms of petroleum other than natural gas are "*condensate*, which is gaseous in the ground, but condenses at the surface, and *crude oil*, the liquid part of petroleum." Hunt, *supra*, at 23. Coal is not a form of petroleum, but is rather a distinct fossil fuel. S. I. Tomkeieff, *Coals and Bitumens* 9-10 (1954).

Natural gas is, like coal itself, formed from the chemical breakdown of ancient organic matter as it is exposed to microorganisms and high temperatures during its progressively deeper burial under the earth's surface. Tissot & Welte, *supra*, at 71-79, 201-18. There are four major sources of natural gas: "(1) methanogenic bacteria, (2) all types of kerogens, (3) coal, and (4) oil in source and reservoir rocks." Hunt, *supra*, at 186.[4]

Methanogenic bacteria act in the first phase of gas formation. Organic matter is deposited in aquatic environments, and is decomposed by microorganisms in water and in shallow sands and muds. Tissot & Welte, *supra*, at 69-71. Methane is the principal hydrocarbon released during decomposition, but much of it dissipates into the environment, and bacterial methane represents only a small part of natural gas reserves today. *Id.* at 201-04; Hunt, *supra*, at 187-88. As the organic carbon residue from this process is buried by new layers of sediment,

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[3] Petroleum "is a form of bitumen composed principally of hydrocarbons and existing in the natural gaseous or liquid state in its natural reservoir," but "[i]n common usage, it has come to mean any hydrocarbon mixture that can be produced through a drill pipe." Hunt, *supra*, at 23. The term "bitumen" refers generally to organic matter in sedimentary rocks that is soluble. Tissot & Welte, *supra*, at 131-32; Hunt, *supra*, at 634. A "hydrocarbon" is a compound consisting only of hydrogen and carbon. *Id.* at 637.

[4] Kerogen is insoluble organic matter (animal and plant) in sedimentary rocks. Tissot & Welte, *supra*, at 131. Kerogen is the most abundant and important form of organic carbon, and is the source of most oil and gas. *Id.*; Hunt, *supra*, at 126-28.

it becomes condensed into kerogen, or (under certain circumstances where the deposition of plant matter was massive) into coal. Tissot & Welte, *supra*, at 70. As temperature and pressure increase with further burial, the existing kerogen or coal is no longer in equilibrium with its environment and breaks down into more stable chemical arrangements. *Id.* at 160. Methane is released as the carbon bonds in kerogen or coal (or in the oil liberated from kerogen and coal) crack apart. *Id.* at 204-06; Hunt, *supra*, at 186. Thus, methane and other components of natural gas are byproducts of the geothermal breakdown of kerogen and coal.

Natural gas is migratory. Driven by subsurface pressure and water flow, natural gas sometimes travels from its source rock, and accumulates in what are known as "reservoir rocks," which are permeable and porous rock formations (*e.g.*, sandstone) with a natural seal that prevents the gas from escaping. Tissot & Welte, *supra*, 293-95, 341. Gas exists in reservoirs in three states: as "free gas" trapped in rock fractures; dissolved in water; and in a state of "adsorption," where the gas under conditions of high subsurface pressure adheres to the surface of the rock pores. Affidavit and Report of Douglas M. Smith, Joint Appendix ("J.A.") Vol. 1, at 239-40, 249-50.[5]

The accumulation of natural gas in large quantities in reservoirs allows for commercial development, and the gas is tapped by drilling wells into the reservoir. Because gas flows in the direction of lower pressure and concentration, it will flow through the well bore, where it is captured for treatment and transport. Affidavit and Report of Matthew J. Mavor, J.A. Vol. 1, at 203-05.

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[5] Physical adsorption (the kind that occurs in gas reservoirs) is a universal phenomenon whenever a gas and a solid surface are present together, as the gas is attracted to the surface by weak intermolecular forces known as van der Waals forces. Smith, *supra*, J.A. Vol. 1, at 234-36, 240-42; Affidavit and Report of Dan Yee, J.A. Vol. 1, at 263-64.

As the foregoing indicates, "[t]he general scheme of hydrocarbon generation from coal parallels that from kerogen in petroleum source rocks." Tissot & Welte, *supra*, at 250. It is hardly surprising that the generation of natural gas is the same from coal as from other source rocks; coal is formed out of the same plant debris as certain types of kerogen, the difference being that coal occurs where the deposit of debris is massive and confined rather than dispersed. *Id.* at 157; Hunt, *supra*, at 637-38 (definition of "kerogen"). As is true whenever natural gas originates from any source rock, the gas is no longer part of the chemical structure of the coal that is its source; rather, it is "liberated" from the coal. Tissot & Welte, *supra*, at 245-46; see Stach, *supra*, at 43 (describing "the substantial losses of methane" as coal passes through the early bituminous stages); *id.* at 402 ("in the different coalification stages . . . varying amounts of methane are released from the coal").[6]

Because coalification yields a coal rock that is permeable and porous, the coal also acts as a reservoir for gas. See James E. Fassett, *Coal-Bed Methane—A Contumacious, Free-Spirited Bride; The Geologic Handmaiden of Coal Beds, in Energy Frontiers in the Rockies* 131, 132 (John C. Lorenz et al. eds., 1989). Coal is not unique in this respect; carbonaceous shales, for example, also are both the source and the reservoir of natural gas.[7] Even so, coalification generates far more methane than can be stored in the coal itself; indeed, most of the methane generated (up to 95% for some coals) escapes from the coalbed, and is often trapped in other reservoir rock. Stach, *supra*, at 402; Tissot & Welte, *supra*, at 248.

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[6] Moreover, when gas is generated from coal, not all of the gas comes directly from the coal itself; "by the semianthracite stage, one-third of the gas has come directly from coal and two-thirds from the cracking of the oil generated by coal . . . ." Hunt, *supra*, at 211.

[7] *See* Robert C. Milici, *Autogenic Gas (Self Sourced) From Shales —An Example From the Appalachian Basin, in The Future of Energy Gases* 253, 256 (U.S.G.S. Prof. Paper 1570, David G. Howell ed., 1993).

The gas that is stored in the coal formation is referred to in the trade as "coalbed gas" or "coalbed methane" (CBM). This latter term is a misnomer, for (like any natural gas) coalbed gas is a mixture of methane principally and small amounts of other gases. See Fassett, *supra,* at 132; Smith, *supra,* J.A. Vol. 1, at 239-40. It is, of course, the same gas as the coal-generated gas that has traveled to an adjacent rock stratum.

There is nothing unique in the way gas exists in coal reservoirs, as the Department of the Interior has formally recognized. *Rights to Coalbed Methane Under an Oil & Gas Lease for Lands in the Jicarilla Apache Reservation,* 98 Interior Dec. 59 (1990) (Pet. App. 165a). Gas exists in coal formations in the same three states as it exists in any reservoir: free gas, dissolved in water, and "adsorbed" to the pores of the rock. Smith, *supra,* J.A. Vol. 1, at 239-40, 249-50. In general, a much greater percentage of gas in coal is in the adsorbed state than in "conventional" reservoirs (such as limestone or sandstone), largely because of high surface volume created by the small size of the pores in the coal rock. *Id.* at 240-41.[8] The basic mechanism of gas storage is, however, precisely the same. *Id.* at 234-36.

Moreover, natural gas formed from other sources may migrate into and be trapped in the coal reservoir. Mavor, *supra,* J.A. Vol. 1, at 194-95. Indeed, a recent study published after this litigation commenced found that, contrary to earlier assumptions, up to 60% of the gas in the Fruitland Coal Formation at issue in this case actually migrated *into* the coal seam. Andrew R. Scott et al., *Thermogenic and Secondary Biogenic Gases, San Juan Basin, Colorado and New Mexico—Implications for Coalbed Gas Producibility,* 78 AAPG Bulletin 1186, 1206 (1994).

In short, as has been known for centuries, the gas in coal formations is simply natural gas. It is formed in the

[8] Other reservoirs (such as Devonian shales) with comparable properties also have large volumes of natural gas stored by adsorption. Mavor, *supra,* at 4 (J.A. Vol. 1., at 197).

same manner as any other natural gas, and the mechanisms of its storage and flow in the reservoir are the same. Coalbed gas is produced using standard drilling, completion, and pumping equipment and techniques. It is gathered and treated in gas plants like any natural gas; commingled and transported in pipelines with gas from other geologic formations; and used by consumers for the same purposes in exactly the same fashion as all other natural gas. Mavor, *supra,* J.A. Vol. 1, at 185-86.

The 1981 Solicitor's Opinion on Coalbed Gas Rights in Federal Lands. In the 1970s, scientists came to recognize coalbed gas, long known as a hazard and waste product of coal mining, as a potentially significant commercial resource. See, *e.g.,* M. Deul & A. Kim, *Coalbed Gas: A Source of Natural Gas,* Oil & Gas J., June 16, 1975, at 47. In the aftermath of the Arab oil embargo of that decade, the federal government began broadly to promote all new kinds of gas production actively through grants, see, *e.g.,* 42 U.S.C. §§ 5901-5915, and substantial tax credits, see 26 U.S.C. § 29.

Because extensive coalbed gas reserves are found in the millions of acres of land covered by the 1909 and 1910 Acts, the question of title to coalbed gas came before the Department of Interior in its capacity as the agency that administers the 1909 and 1910 Acts. "In order to expedite the development of this energy source," *Ownership of & Right to Extract Coalbed Gas in Federal Coal Deposits,* 88 Interior Dec. 538, 539 (1981) (Pet. App. 142a), the Solicitor of Interior in 1981 issued an opinion binding on all Department of Interior offices and officials that the reservation of "coal" to the United States in the 1909 and 1910 Acts did not include coalbed gas. Pet. App. 140a; Pet. App. 180a.

Drawing on Departmental expertise in mineral resources, the Solicitor first determined that "[c]oalbed methane is both scientifically defined and legally regarded as a gas," and that coal and CBM "are distinct, and are potentially severable." Pet. App. 143a-144a (footnotes omitted). Carefully examining the legislative history re-

counted above, the Solicitor determined that "[t]he statutory language and the legislative history belie the argument that Congress intended to reserve any mineral other than coal in the 1909 and 1910 Acts." Pet. App. 147a. Subsequent statutes confirmed the narrowness of the reservation, among them the Act of July 17, 1914, ch. 142, 38 Stat. 509 (codified as amended at 30 U.S.C. §§ 121-123) ("1914 Act"), that separately reserved "gas" to the United States on lands classified as valuable for that mineral,[9] and legislation in 1933 and 1955 that treated coal and other reserved minerals as distinct from the unreserved minerals they host. Pet. App. 147a-149a. Finally, the Secretary found that under the Mineral Leasing Act, coalbed gas fit the definition of "gas" in Department of Interior regulations. Pet. App. 152a-159a. In reliance on the Solicitor's 1981 opinion, gas producers throughout the country entered into leases with the owners of the gas estate, expending billions of dollars in capital investments, and a boom in coalbed gas production ensued. See Petition 24-25.[10]

This Litigation. The Tribe abandoned its original lands in the nineteenth century and relocated to a reservation in Colorado along with other Ute tribes. After the infamous "Meeker Massacre" of settlers by members of a different Ute tribe, Congress in 1880 extinguished all tribal ownership of reservation lands, resettled the Tribe to unoccupied lands along the La Plata River, allotted lands to individual Indians, and provided for the remainder to be ceded back to the United States. See *United*

[9] The Solicitor expressly determined that coalbed gas was reserved as "gas" in lands patented under the 1914 Act that were classified as valuable for gas. Pet. App. 151a-152a.

[10] In a one-sentence retraction memorandum, the current Solicitor of the Interior withdrew this opinion on the day the federal respondents' brief in opposition to the petition for certiorari was due. *See* Br. in Opposition of Federal Resp'ts App. 1a. After granting certiorari, this Court modified the question presented to eliminate consideration of whether the 1981 Solicitor's opinion was entitled to deference under *Chevron U.S.A. Inc.* v. *Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984). Order of January 29, 1999.

States v. *Southern Ute Tribe*, 402 U.S. 159, 161-64 (1971). Many of those ceded, non-allotted lands were patented to settlers under various public land laws, subject after the 1909 and 1910 Acts to a reservation of coal to the United States where lands were classified as valuable for that mineral. In 1938, pursuant to a statute that authorized restoration of tribal ownership of reservation lands (without impairment of any existing rights to the land), the Department of Interior conveyed equitable title to the Tribe in approximately 450,000 acres where no homestead had been established, and in 200,000 acres of coal that had been reserved to the United States under the 1909 and 1910 Acts. As a result of these transfers, "the Tribe's reservation is a checkerboard" of Indian and non-Indian lands. Pet. App. 109a-110a. A tract in which the Tribe owns the surface and all minerals often is adjacent to another in which the Tribe owns only the coal because the surface and other minerals have been patented to settlers. See Br. of *Amicus Curiae* La Plata County in Support of Petition for Certiorari (attached map).

The Southern Ute reservation is located within the San Juan Basin, which is the leading CBM-producing basin in the West. In reliance on the 1981 Solicitor's opinion, oil and gas companies entered into leases to produce coalbed gas with individual landowners holding title under 1909 and 1910 Act patents to the more than 200,000 acres where the Tribe owned only the coal. For tribal lands, the Tribe issued oil and gas leases to the same producers for coalbed gas production. The Tribe pooled its lands with non-Indian fee lands in communitization agreements and granted rights of way across tribal lands and roads, sharing royalties for the coalbed gas with the fee owners.

Its conduct notwithstanding, in 1991 the Tribe brought this action against petitioners, who are royalty owners and producers under oil and gas leases covering the 200,000 acres where the Tribe owns the coal (but not oil and gas), as well as against various federal agencies and officials responsible for land held in trust for the Tribe. The

Tribe sought "a declaration that it owns the beneficial interest in the coal, including all substances located in the coalbeds and coal strata," such as "coalbed methane, water, [and] carbon dioxide." First Amended Complaint ¶ 1 (J.A. Vol. 1, at 163). The Tribe alleged that Congress' reservation of "coal" to the United States in lands patented under the 1909 and 1910 Acts encompassed these substances, and therefore it owns them pursuant to the transfer of federal interests in coal to the Tribe in 1938. *Id.* ¶¶ 10-15 (J.A. Vol. 1, at 167-78). Besides the declaration of ownership, the Tribe sought a quiet-title order, injunctive relief, and an award of damages against petitioners for trespass, conversion, conspiracy to deprive them of property under color of state law, and unpaid tribal taxes and penalties. *Id.* Prayer for Relief (J.A. Vol. 1, at 179-82).

In 1992, the district court certified a class of non-federal defendants (naming Amoco Production Company ("Amoco") as class representative), and in 1994 it awarded summary judgment to the class and the federal defendants [11] on the basis of its interpretation of the plain meaning of the term "coal" in the 1909 and 1910 Acts. Pet. App. 99a. The district court reviewed dictionaries from the early Twentieth Century that uniformly defined coal as a solid, but held that in any event "common sense dictates that in 1909 and 1910, Congress intended 'coal' to mean the solid rock substance." Pet. App. 114a. Given that the Acts did not once mention "gas" or any "constituent" of coal, the district court stated that "it would require not merely some, but herculean ingenuity to create ambiguity in the 1909 and 1910 Acts." Pet. App. 115a.

Examining the legislative history, the district court concluded that Congress meant "to depart in the most narrow way possible from the historic practice of the United

[11] The class and the federal defendants had each filed motions for summary judgment in which they argued that the reservation of "coal" in the 1909 and 1910 Acts did not include coalbed gas.

States to grant fee simple absolute title to homesteaders," and reserved only the solid rock coal "to insure an adequate source of the nation's primary energy resource." Pet. App. 123a-124a. The district court also found significant that the 1914 Act separately reserved "gas" and other named minerals on lands valuable for those minerals, and that it was not until 1916 that Congress broadly reserved "all the coal and other minerals," 43 U.S.C. § 299, in a land-grant statute. Pet. App. 124a-127a. The district court held in the alternative that, even if ambiguity could be wrung from the term "coal," the 1981 Solicitor's opinion was entitled to *Chevron* deference. Pet. App. 128a-129a.

On appeal, the Tenth Circuit reversed. A panel of the court held that the term "coal" was ambiguous; that the 1981 Solicitor's opinion was not entitled to *Chevron* deference in resolving that ambiguity; and that the ambiguity should be resolved against the grantee so that no public land passed by implication. Pet. App. 52a-94a. The court granted rehearing *en banc* limited to the question of whether the term "coal" in the 1909 and 1910 Acts "unambiguously excludes or includes CBM." Pet. App. 8a. By a 6-3 decision, with four judges recused, the court *en banc* agreed with the panel that the 1909 and 1910 Acts were ambiguous, and adopted the panel opinion with modifications. Pet. App. 8a-11a.

The *en banc* court began its analysis, before it even addressed the text of the 1909 and 1910 Acts, with the admonition that "[o]f critical importance is the long recognized principle of statutory construction, applicable here, that ambiguity or uncertainty in the terms employed in land grants should be resolved in favor of the government." Pet. App. 10a-11a (quotation and brackets omitted). The court then summarily dispensed with an analysis of the statutory language, asserting that because "[the] Acts neither define coal nor mention CBM," therefore "the statutes do not by their plain language indicate congressional intent regarding CBM." Pet. App. 14a.

The court then undertook to divine "Congress' specific intent to include or exclude CBM in its reservation of coal." Pet. App. 14a. Relying on what it believed were ambiguous discussions of coal's chemical composition in contemporary texts, and on modern scientific findings that most CBM *in situ* is adsorbed to the surface of the coal, the court concluded that "CBM is not sufficiently like other natural gases for us to conclude that Congress in 1909 unambiguously intended the owners of other natural gases to also own CBM associated with the reserved coal." Pet. App. 18a-19a (footnotes omitted). Because CBM was regarded as a waste product that at the time could only be extracted by damaging the coal, the court doubted that Congress formed "a specific intent to convey CBM as a gas." Pet. App. 24a. The court found present-day exploitation of CBM by the coal owner to be consistent with Congress' "general intent" to reserve all coal that may have future economic value. Pet. App. 32a.

Having determined that the term "coal" in the 1909 and 1910 Acts "neither unambiguously includes or excludes coalbed methane," the court of appeals resorted to the rule that doubts respecting land grants are resolved in favor of the government, and held that the reservation of coal "includes the adsorbed CBM." Pet. App. 32a-33a. The court specifically declined to "address ownership of CBM that may have migrated away from the coal into adjacent non-coal strata." Pet. App. 18a n.8.

Judge Tacha, joined by Judges Anderson and Baldock, dissented from the *en banc* decision. Judge Tacha pointed out that "coal" was uniformly defined in dictionaries of the time as a solid rock fuel, and "[i]t is extremely unlikely . . . that a people as familiar with CBM gas as the people of 1909 would define coal as a 'solid' if they also thought of CBM gas as coal." Pet. App. 37a. Because CBM's status as a waste product made its ownership undesirable, "one would not expect the United States to reserve it," underscoring that Congress did no more than reserve the solid rock fuel known as coal. Pet. App. 39a. Judge Tacha faulted the majority for its "central interpretive error" of deducing that the failure of the statutes to define "coal" or mention CBM creates ambiguity as to whether Congress reserved CBM to the United States. "Silence does not equate with ambiguity." Pet. App. 39a-40a.

Judge Tacha further criticized the majority for inferring that Congress would have distinguished between the CBM remaining in the coalbed and the 90 percent of coalbed gas that migrates into adjacent rock. Pet. App. 40a-41a. She also dismissed the majority's claim that CBM's adsorption to the pores of the solid coal is of legal relevance. "Physical sorption occurs between gases of all types and solids," and involves the same pervasive forces of molecular attraction that bind paper to the table on which it sits. Pet. App. 43a. Finally, the majority's claim that CBM could not be extracted without damaging the coal, even if true, has no bearing on the issue of ownership. The law of split estates has always permitted the owner of other minerals to extract them so long as "he does not unreasonably damage the coal." Pet. App. 47a. The dissent concluded that coal has a plain and ordinary meaning in the 1909 and 1910 Acts that does not encompass coalbed gas. Pet. App. 50a-51a.

SUMMARY OF THE ARGUMENT

In interpreting statutes reserving minerals, this Court gives the minerals reserved their ordinary and popular meaning, on the premise that Congress deals with a practical subject in a practical way. In the 1909 and 1910 Acts, Congress reserved simply and exclusively "coal" and no other mineral. Coal, as popularly understood, is a solid combustible rock; it is not part gas. That was true in 1909, and it is true today. The 1909 and 1910 Acts by their plain terms reserve the solid rock coal to the United States, and pass the surface and all other minerals (including natural gas) to the patentee. Coalbed gas is natural gas, and therefore it belongs to the patentee.

Surrounding provisions in the statutes confirm the plain and limited meaning of the reservation. The patentee was entitled to use the reserved coal for "domestic purposes"; that is a clear reference to solid coal, because coalbed gas was never captured for residential use. Moreover, the reservation applies to lands that were classified as valuable for coal by the Department of Interior. Interior classified lands by the presence and value of solid coal, using "air-dried" (*i.e.*, gas-free) samples of solid coal. The presence *vel non* of coalbed gas played no part in the classification of lands as valuable for coal.

History explains why Congress limited the reservation as it did. Congress was faced with a crisis in the supply of *solid* coal, fraudulent misclassification of lands containing valuable *solid* coal, and the danger of monopolization of *solid* coal by railroad interests that had abused the homesteading laws. The initial response to that crisis —blanket withdrawal of lands from homestead entry and conveyance—unduly prejudiced the rights of settlers and inhibited settlement of the West. Congress sought to secure federal control of that mineral, but at the same time to minimize encroachment on the traditional rights of homesteaders. It considered and rejected bills and amendments that specifically would have reserved "gas" and other precious minerals to the United States, departing from the historic practice of granting fee-simple patents only to the extent necessary to meet the crisis at hand: namely, by reserving the specific mineral coal, and only on lands classified as valuable for that mineral.

Other minerals statutes underscore that Congress intended only to reserve the solid mineral coal in 1909 and 1910. When Congress decided to reserve gas, as it did four years later, it did just that: it reserved "gas," and only in lands deemed valuable for gas, not for solid coal. Moreover, the 1909, 1910, and 1914 Acts must be construed *in pari materia* with the Mineral Leasing Act of 1920, which provides for the disposition of reserved minerals. The provisions of that Act, and the Department of Interior's authoritative implementing regulations, confirm

that coalbed gas is "gas" reserved under the 1914 Act and not "coal" reserved under the 1909 and 1910 Acts.

The Tenth Circuit rejected this straightforward construction of the Coal Lands Acts. Placing the burden on petitioners to dispel ambiguity in the statutes, it ruled that the Acts had no plain meaning because they did not define the everyday term "coal." Despite this Court's admonition that mineral reservations are not construed according to scientific definitions, the Tenth Circuit ventured into an analysis of turn-of-the-century understandings of the chemistry of coal, finding ambiguity solely by misreading contemporary texts. Mistaking silence as to coalbed gas for ambiguity in the word "coal," the Court ruled that ambiguity should be construed in favor of the sovereign. The end result is an unprecedented split gas estate, where "adsorbed CBM" is reserved to the United States, but any gas that migrates from the coalbed to an adjoining layer of noncoal rock and all other natural gas belongs to the patentee. Even the federal respondents have elsewhere admitted this type of split estate would be unusually difficult to administer. Such an impractical construction, so contrary to the plain language and history of the Acts, should be rejected. The judgment below should be reversed.

ARGUMENT

I. THE PLAIN MEANING OF THE 1909 AND 1910 ACTS IS THAT THE SOLID ROCK FUEL "COAL" IS RESERVED TO THE UNITED STATES WHILE THE SURFACE AND ALL OTHER MINERALS (INCLUDING NATURAL GAS) PASS TO THE PATENTEE.

In statutory construction, "deference to the supremacy of the Legislature, as well as recognition that Congressmen typically vote on the language of a bill, generally requires [courts] to assume that the legislative purpose is expressed by the ordinary meaning of the words used." *United States* v. *Locke*, 471 U.S. 84, 95 (1985) (internal quotation marks omitted). Thus, "unless otherwise defined, words will be interpreted as taking their ordinary,

contemporary, common meaning . . . at the time Congress enacted the statute . . . ." *Perrin* v. *United States*, 444 U.S. 37, 42 (1979).

This Court has emphasized the special importance of the ordinary-meaning rule in construing statutory mineral reservations. In *Burke* v. *Southern Pac. R.R. Co.*, 234 U.S. 669 (1914), this Court confronted the question of whether a reservation of "mineral lands" included petroleum lands, and was "asked to give effect to the strictly scientific view that petroleum is a resultant of the decomposition of organic matter . . . and therefore is not a mineral." *Id.* at 679. The Court assumed that oil was not a mineral in the scientific sense, but held that a "strictly scientific" definition "is not the test contemplated by the statute." *Id.* Congress "was dealing with a practical subject in a practical way, and we think it used the words 'mineral lands,' and intended that they should be applied, in their ordinary and popular sense." *Id.*[12]

A. Coal Was Popularly Understood In 1909 To Refer To A Solid Combustible Rock, Not Gas.

Few terms would have been better understood in common parlance in 1909 than the word "coal," the solid rock fuel that was the country's primary energy resource at the turn of the century, used both in households and in commerce. See Sam H. Schurr et al., *Energy in the American Economy, 1850-1975*, at 61-64, 68-69 (1960). Although resort to dictionaries is hardly necessary for an everyday term like "coal," see Pet. App. 114a, dictionaries of the time can establish the plain meaning of undefined statutory terms. See *American Textile Mfrs. Inst., Inc.* v. *Donovan*, 452 U.S. 490, 508-09 (1981). Predictably, such dictionaries uniformly define coal as a solid combustible rock.

[12] *Burke*'s ordinary-meaning rule also serves the important principle in public land law of certainty of title. *Barden* v. *Northern Pac. R.R. Co.*, 154 U.S. 288, 326 (1894); *Deffeback*, 115 U.S. at 404. A patent issued under the 1909 and 1910 Acts was meant to declare in no uncertain terms to the homesteader what property was his (and could be alienated) and what belonged to the United States.

For example, one dictionary of the era defined coal as a "solid and more or less distinctly stratified mineral, . . . brittle, combustible, and used as fuel, not fusible without decomposition, and very insoluble." II *Century Dictionary and Cyclopedia* 1067 (1906-09). Coalbed gas is, of course, not a solid, even when adsorbed to the surface of the rock, and it is also soluble; it simply does not fit within the definition of coal. Other dictionaries give no suggestion that coal was understood as anything but a solid combustible rock. See, *e.g.*, *The Universal Encyclopaedic Dictionary* 945 (1905) (defining "coal" as "a stratified rock"); *American Dictionary of the English Language* 244 (1889) (coal is a "solid, combustible substance"); II *New English Dictionary On Historical Principles* 549 (1893) (coal is a "mineral, solid, hard, opaque").[13] That remains the modern dictionary definition of coal. Compare *Webster's New International Dictionary* 424 (1916) (coal is a "black, or brownish black, solid, combustible mineral substance formed by the partial decomposition of vegetable matter . . .") with *Webster's Third New International Dictionary* 432 (1986) (same).

Contemporary treatises on coal similarly identify it as a solid combustible rock, not as partly gas. One such turn-of-the century work defines it as "a solid stratified mineral substance, black or brown in color, and of such a nature that it can be economically burnt in furnaces or grates." See William A. Barr, *A Catechism on the Combustion of Coal and the Prevention of Smoke* 10 (1901). Marsh gas, by contrast, "occurs in the coal measures, where it is known as firedamp," just as it "occurs in marshy places" from the putrefaction of plant matter under water. *Id.* at 170. See also Marie C. Stopes & R. V. Wheeler, *Monograph on the Constitution of Coal* 2 (1918) ("Ordi-

[13] These dictionaries define "marsh gas," "methane," and "firedamp" as gases "given off by," "occur[ring] in," "evolved from," "contained in," "found in," or "accumulat[ing] in" coal measures, but not as a constituent part of the coal itself. *See, e.g.*, III *Century Dictionary and Cyclopedia*, at 2229; V *id.* at 3740; *Universal Encyclopaedic Dictionary* at 1837, 2637, 2696; IV *New English Dictionary* 243 (1901); VI *New English Dictionary* 188 (1908).

nary coal is a compact, stratified mass of 'mummified' plants . . ." (emphasis omitted)); F.R. Wadleigh, *Coal Manual for Salesmen, Buyers, and Users* 9 (1921) ("Coal . . . is a carbonaceous rock of complex and varying nature, its origin vegetable matter, altered by various geological and chemical processes to form coal as it exists today."); Elwood S. Moore, *Coal* 3 (1922) (coal "is as much a rock as are standstone and limestone"); Stutzer, *supra*, at 1. This remains the prevailing scientific definition of coal today. See *supra*, at 7 (citing modern definitions).

Its present stance in this litigation notwithstanding, the Department of Interior has long defined coal as "combustible carbonaceous rock, classified as anthracite, bituminous, subbituminous, or lignite." 30 C.F.R. § 700.5; see also *id.* § 206.251; 25 C.F.R. § 211.3 (coal included in definition of solid minerals); Leasing of Tribal Lands for Mineral Development, 61 Fed. Reg. 35,634, 35,639 (Jul. 8, 1996) ("Coal is . . . a solid"). Indeed, its own glossary of mining terms from 1920 offers the following definition of coal:

> A solid and more or less distinctly stratified carbonaceous substance varying in color from dark-brown to black, brittle, combustible, and used as a fuel; not fusible without decomposition and very insoluble.

Albert H. Fay, Department of Interior, *A Glossary of the Mining and Mineral Industry* 163 (Bureau of Mines Bulletin 95, 1920) ("*1920 Glossary*"); *accord* Department of Interior, *A Dictionary of Mining, Mineral, and Related Terms* 222 (1968) (same, except uses term "carbonaceous rock"); *Instructions*, 48 Pub. Lands Dec. 300, 301 (1921) (relying on this "generally accepted" 1920 definition in construing statutory term "coal" under the Mineral Leasing Act). The Department cannot argue that soluble coalbed gas meets its own longstanding definition of coal as an insoluble solid. Tellingly, the 1920 glossary defines "fire damp" as formed from the "decomposition of coal," and thus plainly not coal itself. *1920 Glossary* at 270.

This Court has also recognized the common-sense distinction between coal and gas in its decisions, stating that natural gas, a fugacious mineral, "differ[s] from solids in place such as coal." *Champlin Ref. Co.* v. *Corporation Comm'n*, 286 U.S. 210, 233 (1932); see also *United States* v. *Buffalo Natural Gas Fuel Co.*, 172 U.S. 339, 342 (1899) (relying on testimony that the statutory term "crude bitumen" encompassed many distinct substances, including those that are "gaseous, as natural gas or marsh gas" and those that are "solid, as . . . bituminous or anthracite coal"). Coal is the operative language in the 1909 and 1910 Acts, stating what property is reserved to the United States, and it refers only to the solid combustible rock known as coal.

B. Other Provisions Of The Coal Lands Act Verify That The Reservation Of "Coal" Refers Only To The Solid Mineral Fuel, And Not To Gas.

The surrounding provisions of the 1909 and 1910 Acts confirm the plain meaning of the reservation. See *American Fed'n of Musicians* v. *Wittstein*, 379 U.S. 171, 176 (1964). Both the 1909 and 1910 Acts provide patentees "the right to mine coal for use on the land for *domestic purposes* prior to disposal by the United States. . . ." 30 U.S.C. § 81, 85 (emphasis added). When Congress enacted the 1909 and 1910 Acts, coal, the solid rock, was used to heat homes on the lands that had been and would be entered. See, *e.g.*, *Coal Handbook* 306 (Robert A. Mayer ed., 1981) (coal was the dominant residential fuel as late as 1935); 45 Cong. Rec. 6153 (1910) (remarks of Rep. Craig) (lignite coal usable for domestic purposes). Coalbed gas (like natural gas generally) was not captured by settlers for use as a domestic fuel.

Furthermore, both the 1909 and 1910 Acts provide that entrymen could contest Interior's "classification" of lands "valuable" for "coal" and, if successful, secure "a patent without reservation." 30 U.S.C. §§ 81, 85. Those provisions indisputably refer to Interior's classification of lands using criteria pertaining exclusively to solid coal, with which Congress was well familiar. See *Classification*

and Valuation of Coal Lands, 37 Pub. Lands Dec. 653 (1909) (Pet. App. 137a); H.R. Rep. No. 61-377, at 1, 4 (1910); 43 Cong. Rec. 2504 (1909); 45 Cong. Rec. 6040-41 (1910). Interior divided "coal deposits"[14] into four classes based on the rank of solid coal present and its fuel value, determined by using an "air-dried" (that is, *gas-free*) sample. Pet. App. 137a. If the coal met certain criteria of depth and thickness to warrant classification of the land as coal land, it was then valued on the basis of recoverable tonnage and proximity to railroads—factors only of significance for solid coal. Pet. App. 138a-139a. The presence and recoverability of gas in the coal formation played no part in the classification and valuation of coal lands. There is no ambiguity as to what Congress meant by reserving coal; it is the same coal that for a half-century was the basis for identifying the "coal lands" subject to disposal under the Coal Lands Acts of 1864 and 1873. The only mineral reserved in the 1909 and 1910 Acts by Congress, dealing as it was "with a practical subject in a practical way," *Burke*, 234 U.S. at 679, is the solid combustible rock coal.

Because the meaning of the reservation is plain, so too is the meaning of the "patent to the land entered," 30 U.S.C. § 85; see also *id.* § 81. Prior to the enactment of the 1909 and 1910 Acts, as noted above, the "patentee received title to the entire land, including any subsequently discovered minerals." *Western Nuclear*, 462 U.S. at 48 n.9. For a homesteader who did not challenge (or challenge successfully) the classification of the lands as valuable for coal, the 1909 and 1910 Acts altered that

[14] The term "coal deposits," also used periodically in the statutes, does not connote anything different from the term "coal," as both this Court and the Department of Interior have recognized. *See Andrus* v. *Shell Oil Co.*, 446 U.S. 657, 658 n.1 (1980); Pet. App. 166a (noting consistent Interior definition since 1920 of "mineral deposit" as "any natural occurrence of a useful mineral or ore in sufficient extent and degree of concentration to invite exploitation") (internal quotation marks omitted). The Department also determined in 1990 that coalbed methane deposits are "'oil and gas deposits,'" Pet. App. 167a, and thus not coal deposits.

regime only by issuing a patent reserving the "specifically identified mineral[] to the United States": namely, coal. *Id.* at 49. Because the only mineral reserved is coal, the 1909 and 1910 Acts plainly authorize the conveyance to the patentee of the surface and all other minerals, including all gas. 6 *American Law of Mining* § 200.04[4] (2d ed. 1998); 2 *Law of Federal Oil and Gas Leases* § 23.18, at 23-58 (Sept. 1998).[15]

II. THE HISTORICAL CONTEXT AND THE PROGRESSION OF PUBLIC LANDS STATUTES CONFIRM THAT THE 1909 AND 1910 ACTS DID NOT RESERVE ANY GAS TO THE UNITED STATES.

Even if the statutory language were not so straightforward, the history and context of the 1909 and 1910 Acts, and their place in the progression of public lands statutes, verify that Congress only intended to reserve coal (and not gas) to the United States.

A. The Limited Reservation Of Coal Reflects Congressional Efforts To Redress A Crisis In The Supply And Control Of Solid Coal With Minimal Encroachment On Settler Property Rights.

Public land statutes must be interpreted in light of the "'condition of the country when the acts were passed.'" *Leo Sheep*, 440 U.S. at 682 (quoting *Winona & Saint Peter R.R. Co.* v. *Barney*, 113 U.S. 618, 625 (1885)). The national condition prompting the 1909 and 1910 Acts was a crisis in the supply and control of *solid* coal from the fraudulent acquisition by railroads of lands valuable for *solid* coal. The immediate response of the federal government—broad withdrawal of such lands from further entry or patent under the non-mineral land laws—jeopardized the traditional rights of homesteaders and the strong national interest in rapid settlement of the West.

[15] *Western Nuclear*'s determination that the 1909 and 1910 Acts only reserve "specific minerals" is fatal to the Tribe's claim that it is entitled to all minerals and other substances that might be found in the coal stratum, including not only coalbed methane but also subsurface water and carbon dioxide.

The 1909 and 1910 Acts were an attempt by Congress to secure federal control of coal with minimal encroachment on the rights of settlers.

As detailed above, *supra* at 2-7, railroad monopolies had fraudulently acquired vast amounts of coal lands and had engaged in coal price-fixing, thus gaining near "absolute control of all production and transportation and marketing of coal." *Clark Testimony*, at 7; Mayer & Riley, *supra*, at 123-27. In an effort to break that monopoly, Roosevelt withdrew lands classified as (or suspected to be) valuable for coal with the intent of precluding agricultural entry altogether; he intended thereby for the federal government to maintain ownership, leasing the right to work the coal under a royalty system. The government would control the rates charged by common carriers to ship the product as well as the prices charged to consumers. 41 Cong. Rec. 2615; see also *Clark Testimony*, at 9, 15-16; Mayer & Riley, *supra*, at 128-33.

Congress resisted this scheme as too prejudicial to the rights of entrymen and the national interest in settlement of the West, but what is critical to this case is how Congress accommodated those conflicting interests. Congress was not interested simply in preserving the surface for the entryman; it rejected bills that would have severed altogether the surface from a broad range of precious minerals (including gas). See *supra* at 5 n.1. At the turn of the century, republican sentiment ran strong in Congress, particularly among representatives of the West. The notion that the federal government could withhold certain property interests from those who settled the West was unacceptable to many. See, *e.g.*, 43 Cong. Rec. 2505 (1909) (remarks of Rep. Marshall); *id.* at 2507 (remarks of Rep. Gronna); 45 Cong. Rec. 6052 (1910) (remarks of Rep. Craig). The vehemence of those sentiments is reflected in Representative Mondell's observations in 1914, castigating another proposal to reserve the entire mineral estate in the patent: "[T]he monarchical theory is to reserve all minerals to the crown, upon the

theory that the mere subject is not entitled to anything except the soil that he stirs. It is a relic of monarchical government, of peonage, if you please." 51 Cong. Rec. 10,494 (1914).

Congress knew that it had "often happened" that rich mineral deposits had been found in homestead lands "years after the patent ha[d] been issued." *Deffeback*, 115 U.S. at 404-05. Nonetheless, Congress refused in 1909 to depart any more than necessary from the principle that the homesteader had earned all of the land, free and clear, by the five years' labor and risk necessary to secure a patent, cf. Homestead Act § 2, 12 Stat. at 392-93. The broader the reservation, the greater would be the intrusion upon his property by those pursuing mineral wealth with government sanction. "The temptation to such exploration would be according to the suspected extent of the minerals, and being thus subject to indiscriminate invasion, the land would be to one having the title poor and valueless, just in proportion to the supposed richness and abundance of its products." *Davis's Administrator* v. *Weibbold*, 139 U.S. 507, 526 (1891).

"[D]ealing with a practical subject in a practical way," *Burke*, 234 U.S. at 679, Congress resolved these competing interests by encroaching upon the homesteader's title only to meet the precise crisis at hand: namely, by reserving coal, but only in lands deemed valuable for coal. This is illustrated by the comments of Rep. Mondell in defending the 1909 Act that he sponsored. See *Federal Energy Admin.* v. *Algonquin SNG, Inc.*, 426 U.S. 548, 564 (1976) (statements of sponsors "deserve[] to be accorded substantial weight in interpreting the statute"). He explained that the Act "is the first legislation before Congress providing for a limited patent, or a patent reserving the mineral. It is necessary in the opinion of our committee by reason of the conditions that exist." 43 Cong. Rec. 2504 (1909). All federal patents issued under prior laws, Rep. Mondell remarked, "have heretofore been patents in fee," which this Court had held to

convey the rights to all minerals in the land to the patentee. *Id.* The following colloquy then took place:

> Mr. STEPHENS of Texas. Could the gentleman better arrive at what he desires by only patenting the surface of the land and reserving all minerals, precious and otherwise?
>
> Mr. MONDELL. That has been discussed at some length and the Committee on Public Lands is not of the opinion that that ought to be done. We believe this is quite a sufficient departure from the past practice of the Government. The lands which this legislation will affect are lands which the department has claimed contain some coals of value.
>
> Mr. STEPHENS of Texas. Is this not a step in the direction of issuing limited patents?
>
> Mr. MONDELL. It is; and I trust this is as far as we will go in that direction.

Id.

The history of the 1910 Act also confirms that Congress intended only to reserve coal, not gas. On December 15, 1909, Secretary of the Interior Ballinger wrote to Chairman Mondell suggesting that he extend the provisions of his bill "to lands containing oil and *natural gas.*" H.R. Rep. No. 61-377, at 5 (1910) (emphasis added). The Public Lands Committee rejected that suggestion. Then, in debate over the bill, Congressman Stephens of Texas proposed that the federal government should reserve not only coal, but also "other fuels, such as gas and oil." 45 Cong. Rec. 6044 (1910). Mondell rebuffed Stephens' proposal, pointing out that coal can be readily identified by outcroppings, but "[g]as is found here and there. Oil and gas present much greater difficulties, when we propose to separate the surface from the mineral, than coal." *Id.*

Such a clear distinction between gas and coal would not have been drawn without challenge if Congress had intended in the 1909 and 1910 Acts to reserve some gas to the United States. Congress' reservation of coal clearly

was not meant to encompass any gas. Furthermore, it defies common sense to infer that Congress intended to reserve marsh gas—a known hazard and waste product of coal mining with no contemplated commercial value—while it passed to the patentee all noncoal minerals in the land, including *precious* minerals like oil or even gold. See Pet. App. 39a (Tacha, J., dissenting) ("Because a reservation of CBM would go against expectations, that would make it *more*, rather than less, imperative for the government to mention the gas in its reservation of coal").

In summary, Congress, respectful and protective of the traditional rights of homesteaders, reserved only the solid rock fuel coal to the United States, an action required by the conditions of the country at the time to break the "practical monopoly of the production and transportation of what is an absolute necessity of everyday life." *Clark Testimony,* at 16. That description can only apply to solid coal. The "concerns with monopolization and speculation that motivated Congress" to enact the 1909 and 1910 Acts "had nothing to do with" coalbed gas, and it is unreasonable to surmise that such gas (unmentioned in the debates) was included within the reservation. *Utah Div. of State Lands* v. *United States,* 482 U.S. 193, 203 (1987) (rejecting claim by the United States that statutory reservation of reservoir sites, enacted to prevent settler monopolization of those sites, included beds of navigable rivers and lakes, which were not subject to that risk).

B. The Historical Progression Of Public Land Statutes Demonstrates That Congress Did Not Intend To Reserve Gas In The 1909 And 1910 Acts.

The land-grant legislation that followed the 1909 and 1910 Acts reinforces that Congress did not intend to reserve gas when it reserved coal. The progression of these statutes shows that, once it had abandoned the separate treatment of mineral and nonmineral lands, Congress only reserved "specifically identified minerals" until 1916, *Western Nuclear,* 462 U.S. at 49; separately re-

served "gas" when it desired that mineral; and, when it reserved gas, only did so where the land was specifically classified as valuable for gas, belying respondents' claim that in the 1909 and 1910 Acts it reserved all gas wherever associated with coal. Furthermore, when it later addressed minerals found in association with reserved minerals, Congress confirmed that the reservations did not encompass anything but the mineral specifically named.

1. *1912 Act*

In 1912, Congress enacted a statute, applicable only to lands in Utah, that reserved "oil and gas in such lands," but only when Interior had previously classified lands as valuable for those specifically identified minerals. Act of Aug. 24, 1912, ch. 367, 37 Stat. 496. Representative Mann sought to expand the reservation to "oil, coal, or gas," where Interior had classified lands as valuable for oil and gas, but not coal. 48 Cong. Rec. 11,324 (1912). Representative Mondell objected to that proposal, and it was not adopted. *Id.* Congress refused to reserve coal in lands that had not been classified as valuable for coal, even though those lands had been classified as valuable for oil and gas, demonstrating the precision and specificity with which Congress reserved the enumerated minerals and the critical role that Interior's classification played. Congress took the same tack for oil and gas in Utah as it had for coal in the 1909 and 1910 Acts because "[t]he extension of this method of disposal to lands containing mineral deposits *other than coal* is considered logical and desirable." H.R. Rep. No. 62-1155, at 2 (1912) (letter from Acting Secretary of Interior Samuel Adams) (emphasis added); 48 Cong. Rec. 3479 (1912) (remarks of Sen. Smoot). Congressional action on the 1912 Act demonstrates both that Congress once again opted for the narrowest possible departure from the historic practice of granting fee simple absolute patents (by reserving only the specific mineral for which the land was valuable), and that it treated coal separately from oil and gas.

2. *1914 Act.*

In the Act of July 17, 1914, ch. 142, 38 Stat. 509 (codified as amended at 30 U.S.C. §§ 121-123), Congress took a more radical step toward broad mineral reservation by expanding the list of specific minerals for which limited patents would be issued. The 1914 Act provided that "[l]ands withdrawn or classified as phosphate, nitrate, potash, oil, gas, or asphaltic minerals, or which are valuable for those deposits, shall be subject to appropriation, location, selection, entry, or purchase, if otherwise available, under the nonmineral land laws of the United States . . . ." 30 U.S.C. § 121. However, any patent issued for such lands "shall contain a reservation to the United States of the deposits on account of which the lands so patented were withdrawn or classified or reported as valuable. . . ." *Id.* § 122.

In sponsoring this Act, Representative Mondell, as he had done in 1909 and 1910, blocked efforts to (i) reserve all of the minerals under the surface and (ii) reserve all of the minerals specifically identified in the bill if Interior had classified lands as valuable for any one of them. 51 Cong. Rec. 10,493-94 (1914) (remarks of Rep. Mondell). Representative Mondell explained why the bill only reserved the specifically identified mineral that was the basis for Interior's land classification. If Congress were to reserve other minerals in those lands, it "must logically go to the extreme of withholding all minerals," *id.* at 10,493, a step it was unwilling to take at that time. Congress chose instead the same kind of limited reservation it had "heretofore provided for in the case of coal." *Id.*

Significantly, Congress in 1914 focused on lands containing both coal on the one hand and oil and gas on the other. Representative Mondell stated that there would be a reservation of both coal and gas only if there were a "double withdrawal" of the land: *i.e.*, if the land were withdrawn as valuable for coal (which would be reserved under the 1909 and 1910 Acts), and as valuable for oil

and gas (which would be reserved under the bill then pending). 51 Cong. Rec. 10,493 (1914) (Rep. Mondell).

As was true in 1912, Congress' action in the 1914 Act in reserving only specifically identified minerals in lands that Interior had previously classified as valuable for those minerals confirms that Congress only reserved the solid rock coal in 1909 and 1910 in coal lands. Before 1916 Congress did not reserve unknown or unnamed minerals. It reserved only the specifically enumerated mineral and then only on lands that had been classified as valuable for that mineral. Moreover, even though Congress understood that coal and gas frequently occur in the same lands, they were subject to different reservations under different statutes. Gas was reserved only under the 1914 Act in land classified as valuable for that mineral; coal was reserved only under the 1909 and 1910 Acts in land valuable for that mineral. Both coal and gas would be reserved to the United States in a particular tract under the different Acts *only if* Interior has completed a "double withdrawal" of lands as valuable for both.

The 1914 Act demonstrates just how unnatural the Tenth Circuit's reading of the term "coal" is. If coalbed methane were found on 1914 Act lands where "gas" is reserved to the United States without qualification, one would expect it to belong to the federal government, as the Department of Interior expressly found in the 1981 Solicitor's opinion. See Pet. App. 151a-152a. After all, the courts (at the urging of the Department of Interior) and the Department itself have held that the 1914 Act term "gas" is broad enough to encompass even nonhydrocarbon gases like carbon dioxide. See *Aulston* v. *United States*, 915 F.2d 584, 595-96 (10th Cir. 1990); *Robert D. Lanier*, 93 Interior Dec. 66, 73-74 (1986). By the Tenth Circuit's and respondents' labored interpretation of the term "coal," however, a 1914 Act patentee who owns the coal also owns the natural gas in the coal formation despite the overall reservation of gas to the United States; the coalbed gas is not "gas" because it is coal. Such an absurdity, by itself, is sufficient to warrant rejecting the

Tenth Circuit's construction of the Coal Lands Acts. See *Rowland* v. *California Men's Colony*, 506 U.S. 194, 200 (1993).[16]

3. *1916 Act.*

In marked contrast to the 1909 and 1910 Acts, in 1916 Congress enacted the Stock-Raising Homestead Act ("SRHA"), ch. 9, 39 Stat. 862 (1916), 43 U.S.C. § 291 *et seq.*, which reserved to the federal government in the large tracts granted under that Act "the coal and other minerals in the lands," irrespective of whether Interior had previously classified the lands as valuable for any mineral. 43 U.S.C. § 299. The SRHA marked the "culminat[ion]" of the "shift" from reservation of "specifically identified minerals" based on "land classification" to a reservation of coal and all other minerals irrespective of Interior's land classification. *Western Nuclear*, 462 U.S. at 49. For the first time Congress reserved more than a "specifically identified mineral[]." *Id.* Congress' use of the language found in the legislation discussed above "demonstrates that Congress knew how to reserve specific minerals when it chose or to make a broad reservation of minerals when it chose." Pet. App. 126a.[17]

Thus, the 1909 and 1910 Acts must be construed in light of the progress of land-grant legislation. Throughout the nineteenth century, Congress granted the home-

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[16] It was well understood in 1909 that marsh gas—a term often used interchangeably with methane—was a form of natural gas. Daniel D. Donahue, *A Treatise on Petroleum and Natural and Manufactured Gases* 6 (1902) (natural gas "is practically identical with marsh gas, known to miners as fire damp"); I Sir Boverton Redwood, *Petroleum* 246 (2d ed. 1906) ("Natural gas consists . . . principally [of] marsh gas") (emphases omitted).

[17] That ability is also reflected in a 1917 Act applicable to lands Interior had classified as valuable for coal in Indian reservations. 30 U.S.C. §§ 86-88. Rather than adopt the approach it had chosen a year earlier in the SRHA, Congress reverted to the 1909 and 1910 Acts model and reserved "coal" where the lands had previously been classified as valuable for that mineral. *See* 54 Cong. Rec. 3639 (1917) (Rep. Mondell) (describing patent as "a fee title, in which is reserved the body of this one mineral").

steader a fee-simple patent, which included any minerals subsequently discovered. In the 1909 and 1910 Acts, Congress departed from that practice only insofar as necessary to meet a crisis in the control and supply of coal, by granting a patent that reserved coal in coal lands only, not (as the Tenth Circuit held) all "newly appreciated value associated with that mineral." Pet. App. 31a.[18] Congress used the term "coal" in its ordinary usage as the solid combustible rock; when it meant to reserve gas, it used the term "gas," and reserved it only where the land was classified as valuable for gas. When Congress in 1916 decided that the country would be better served simply by severing the entire mineral estate regardless of the classification of the land, it adopted a statute accomplishing that goal in clear and expansive terms. In light of this straightforward approach to mineral reservation, there is no basis for the Tenth Circuit's byzantine analysis of the term "coal" to include natural gas in coal formations.

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[18] As did this Court in *Western Nuclear*, Congress itself has recognized that 1909, 1910, and 1914 Act reservations apply only to the specific named mineral and not to "associated" minerals. In 1933 Congress considered how associated potash and sodium were to be developed in New Mexico if the two were commingled, and the federal government had reserved potash but not sodium under the 1914 Act. Congress treated the two as separate minerals, recognizing that "[w]here patents had been issued which reserved the potash, the owner of the surface is the owner of the sodium. thus creating a dual ownership of the same deposit made up of both potash and sodium." H.R. Rep. No. 72-1938, at 2 (1933); *see also* 30 U.S.C. § 124. In 1955 Congress prohibited federal coal lessees from mining atomic "source material" such as uranium embedded in lignite coal owned by the United States under the 1909 and 1910 Acts. 30 U.S.C. § 541d. Congress recognized that a 1909 or 1910 Act patentee has no title to coal but "has title to any valuable source material contained in lignite occurring in his lands" and "possessed fee simple title to all other minerals in the land, including valuable source materials, *regardless of the host material or the mode of occurrence*." H.R. Rep. No. 84-1478 (1955), *reprinted in* 1955 U.S.C.C.A.N. 2996 (emphasis added).

C. The Coal Reservation Does Not Include Gas If The 1909 And 1910 Acts Are Construed *In Pari Materia* With The Mineral Leasing Act.

Statutes reserving minerals in land patents are to be construed *in pari materia* with the Mineral Leasing Act of 1920 ("MLA"), ch. 85, 41 Stat. 437 (codified at 30 U.S.C. § 182), which provides for the disposition of those minerals. *Kinney-Coastal Oil Co.* v. *Kieffer*, 277 U.S. 488, 504 (1928); cf. 30 U.S.C. § 182 (MLA applies to "all deposits of coal . . . under laws reserving to the United States such deposits").

The MLA's coal provisions from 1920 onwards make sense only in reference to coal, the solid mineral, and are inapplicable to CBM gas. Those provisions originally required payment of royalties on the basis of tonnage, in contrast to MLA gas provisions requiring payment of royalties of "5 *per centum in amount or value* of the production." See 41 Stat. at 439, 440, 442 (emphasis added). Similarly, the MLA's coal leasing provisions addressed mining of the solid coal, whereas its gas provisions required "drill[ing] of one or more wells for gas" and provided for conversion of "any gas or petroleum placer claim" to an oil and gas lease. *Id.* at 439, 441-44. As the Department of Interior held in 1921, relying on the definition of coal as a solid carbonaceous substance: "Congress in the use of the word 'coal' in the leasing act clearly employed it in its generally accepted sense, as meaning a natural product used for fuel and a deposit of the character subject to disposition under the coal-land laws." *Instructions*, 48 Pub. Lands Dec. at 301. Nothing in the MLA indicates that coal is ever dealt with as a gas. Indeed, the MLA, as amended, refers to coal as a "nongaseous hydrocarbon substance[]." 30 U.S.C. § 181. Under both the MLA and the 1909 and 1910 Acts, coal is the solid mineral rock.

In keeping with the plain meaning of the MLA, Department of Interior regulations have long defined coal as the solid rock "of all ranks from lignite through anthracite," 30 C.F.R. §§ 206.251, 700.5; 25 C.F.R. § 211.3.

By contrast, Interior has always defined "gas" as "any fluid, either combustible or noncombustible, hydrocarbon or nonhydrocarbon, which is extracted from a reservoir and which has neither independent shape nor volume, but tends to expand indefinitely. It is a substance that exists in a gaseous or rarefied state under standard temperature and pressure conditions." 30 C.F.R. § 206.151; 25 C.F.R. § 211.3. In the courts, the United States has correctly taken the position that these regulations define the "gas" reserved under the 1914 Act. See *Aulston*, 915 F.2d at 595. Because coalbed gas indisputably fits this definition of gas, it is "gas" reserved under the 1914 Act, and not "coal" reserved under the 1909 and 1910 Acts, as the Solicitor of Interior concluded in 1981. Pet. App. 152a-155a.[19] These regulations, unquestionably deserving of *Chevron* deference in interpreting the MLA, are entitled to the same weight in construing the complementary provisions of the 1909 and 1910 Acts. They show that those Acts reserved the solid rock coal, and not gas of any kind.[20]

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[19] In 1981, the Solicitor of Interior pointed out that the coal leasing provisions of the MLA, 30 U.S.C. § 201, unlike provisions applicable to certain other minerals, *id.* §§ 211, 241(a), 261-262, 281-282, do not provide for recovery of any associated minerals owned by the federal government. Pet. App. 156a-157a. Ever since, Interior has leased rights to coalbed gas under oil and gas leases where it owns gas reserved under the 1914 Act.

[20] Even though the Department of Interior's order retracting the 1981 Solicitor's opinion removed the predicate for *Chevron* deference, that opinion should still be accorded weight in this Court's deliberations under *Skidmore* v. *Swift & Co.*, 323 U.S. 134, 140 (1944) (nonbinding agency opinions "constitute a body of experience . . . to which courts . . . may properly resort for guidance"). *See Bragdon* v. *Abbot*, 118 S. Ct. 2196, 2207 (1998). The 1981 opinion is a thorough review of the 1909 and 1910 Acts, their history, and their place within federal minerals law. It has been relied upon in decisions of courts and the Department, *see, e.g.*, Pet. App. 164a-165a & n.2, and private industry invested billions of dollars in reliance upon it. The current litigating position of the federal respondents does not detract from the force of the 1981 opinion, *see Bowen* v. *Georgetown Univ. Hosp.*, 488 U.S. 204, 212 (1988), the fairness of which is underscored by the opinion's adoption of an interpretation that is against the Government's financial interest. *See Andrus*, 446 U.S. at 672-73 (adopting original position of Interior rather than litigating position by which the Treasury "would be substantially enriched").

D. Congress Did Not Create An Unprecedented And Impractical Split Gas Estate In The 1909 And 1910 Acts.

The Tenth Circuit held that the 1909 and 1910 Acts reserved the "adsorbed CBM" to the United States, Pet. App. 33a, but not the same gas that may have migrated into adjacent noncoal strata, Pet. App. 18a n.8, or any other natural gas in the patented land. Such an unprecedented and unworkable split gas estate cannot be imputed to a Congress "dealing with a practical subject in a practical way." *Burke*, 234 U.S. at 679.[21]

As an initial matter, if Congress had so intended to divide the gas estate, it would not have done so cryptically by a reservation of "coal." Unlike fixed minerals like coal, it was understood that title to gas is not established by subsurface location, *Champlin Refining*, 286 U.S. at 233-34; under the rule of capture, the producer is entitled to all gas that flows through the well bore. *Brown* v. *Spillman*, 155 U.S. 665, 669-70 (1895). Indeed, the common law of mining did not view oil and gas as the same kind of estate as coal.

> Like water, [oil and gas] are not the subject of property except in actual occupancy, and a grant of them passes nothing for which ejectment will lie. The fact that oil and gas cannot, *while in the ground, like*

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[21] The Tenth Circuit placed great emphasis on the fact that Congress reserved all "coal" rather than only coal that had commercial value at the time. Pet. App. 28a-30a. Congress, however, did not reserve all coal on public lands, but only coal on lands classified as valuable for that mineral. Furthermore, its decision not to reserve only workable coal on coal lands shows only that Congress captured all the benefits of solid coal for the public and avoided an unworkable split coal estate that would engender endless disputes between the patentee and the federal coal lessee. It does not suggest that Congress thereby reserved a separate mineral and created an impractical split gas estate.

> *the solid minerals, be the subject of an estate distinct from that in the soil,* is the foundation of the distinction between oil and gas rights and general mineral rights . . . .

1 Daniel M. Barringer & John S. Adams, *The Law of Mines and Mining in the United States* 31 (1897) (emphasis added); *accord* Donahue, *supra,* at 10. Thus, conveyance of oil and gas (unlike conveyance of fixed minerals) was understood to give no more than "the exclusive right to reduce to possession the deposits of natural gas and oil found beneath the surface of [the] land." *Ohio Oil Co.* v. *Indiana (No. 1),* 177 U.S. 190, 209 (1900); Donahue, *supra,* at 13. It cannot be presumed that Congress, by the use of the single, everyday word "coal," intended to reserve two mineral interests of a distinct nature, extracted by different means, and treated differently in the law.

This is especially so if the Acts are given the practical construction required by *Burke.* Coal seams are often interfingered with many layers of noncoal rock within a small area. See Mavor, *supra,* J.A. Vol. 1, at 233; Simon & Hopkins, *supra,* at 20-23. Often there is "methane in the rock above or below the coal," Jed H. Mosgrove, *Mine Gases, in Elements of Practical Coal Mining* 253, 264 (Douglas F. Crickmer & David A. Zeeger eds., 2d ed. 1981) and it can be difficult to complete a well only in the coal seam. Furthermore, a single well bore is often used to produce natural gas from multiple gas-bearing subsurface horizons (both coal and noncoal). There are no chemical markers to distinguish adsorbed CBM from the same gas that flows through the well bore from noncoal strata. As the Department of Interior recognized in 1990, "[w]here . . . the coal may be interbedded with other gas-bearing strata, it could be unusually difficult to seal off the coal or to account separately for gas produced from the coal and non-coal strata." Pet. App. 169a n.6. That is true today, and was certainly true in 1909; it cannot be inferred that a Congress protective of landowner rights intended two sets of wells and gathering facilities to be placed on a patentee's property, one to tap coalbeds and another to tap noncoal reservoirs. Congress simply would not have created the unworkable split gas estate concocted by the court of appeals. The only practical interpretation of the 1909 and 1910 Acts is that the reservation of "coal" referred solely to the solid rock fuel commonly known by that name.

III. THE CANON THAT AMBIGUITY IN LAND GRANTS IS RESOLVED IN FAVOR OF THE SOVEREIGN DID NOT ENTITLE THE TENTH CIRCUIT TO DISREGARD THE PLAIN MEANING OF THE STATUTES.

A. The 1909 And 1910 Acts Are Not Ambiguous Because They Fail To Define The Term "Coal" Or Mention Coalbed Gas.

Despite the clarity of the language and history of the 1909 and 1910 Acts, the court of appeals nonetheless reached a contrary result by breaching the most fundamental tenets of statutory construction.

The court started not with the plain language of the statute, but with the canon that "any ambiguity or uncertainty in the terms employed [in a land grant] should be resolved in favor of the Government," *Burke,* 234 U.S. at 680. At the outset, before analyzing the statutory text, the Tenth Circuit declared that canon to be "[o]f critical importance" to this case, and placed "[t]he burden . . . on defendants to dispel any ambiguity in the construction of the coal reservation." Pet. App. 10a-11a. Aside from the fact that no party bears the burden of proof in interpreting statutes, this Court has admonished that rules for resolving statutory ambiguity "come[] into operation at the end of the process of construing what Congress has expressed, not at the beginning as an overriding consideration." *Chapman* v. *United States,* 500 U.S. 453, 463 (1991) (rule of lenity); *Chevron,* 467 U.S. at 842-43 & n.9 (agency deference). Cf. *Western Nuclear,* 462 U.S. at 59-60 (invoking canon at the end of statutory analysis).

Moreover, as this Court stated just last Term, discussing the rule of lenity: "The simple existence of some statutory ambiguity . . . is not sufficient to warrant application of that rule, for most statutes are ambiguous to some degree." *Muscarello* v. *United States*, 118 S. Ct. 1911, 1919 (1998). Tiebreaking presumptions are only invoked "if, after seizing everything from which aid can be derived, we can make no more than a guess as to what Congress intended." *Id.* (quotation marks omitted). This Court has consistently emphasized this same principle in land-grant cases, declaring that "the well-settled rule of this court that public grants are construed strictly against the grantees" does not mean that such grants are "to be so construed as to defeat the intent of the legislature, or to withhold what is given either expressly or by necessary or fair implication . . . ." *Leo Sheep*, 440 U.S. at 682-83 (internal quotation marks omitted). Here, the fair implication of the statute can only be derived by beginning first with the language and traditional tools of statutory construction, applied with the recognition that "the policy of the Federal Government in favor of settlers upon public lands has been liberal." *Northern Pac. R.R. Co.* v. *Amacker*, 175 U.S. 564, 567 (1900) (internal quotation marks omitted).[22]

The court of appeals aggravated its error by refusing to give the term "coal" its plain meaning, reasoning that because the "1909 and 1910 Acts neither define nor mention CBM[,] . . . the statutes do not by their plain language indicate congressional intent regarding CBM." Pet. App. 14a. But the absence of any definition addressing CBM does not entitle a court to disregard the plain meaning of the term "coal." Quite the contrary, "[w]hen a word is not defined by statute, we normally construe it in accord with its ordinary or natural meaning." *Smith* v. *United States*, 508 U.S. 223, 228 (1993). As Judge

[22] *See also United States* v. *Northern Pac. Ry. Co.*, 311 U.S. 317, 361 (1940) (discussing "liberal construction" of homestead laws); *Ard* v. *Brandon*, 156 U.S. 537, 543 (1895) ("The law deals tenderly with one who, in good faith, goes upon the public lands with view to making a home thereon").

Tacha aptly put it in dissent, "[s]ilence does not equate with ambiguity." Pet. App. 40a.

B. The Court Of Appeals Erred In Determining That "Coal" Was An Ambiguous Word In 1909.

Although the meaning of "coal" is clear as day, the Tenth Circuit purported to find ambiguity based on discussions of the chemical composition of coal in certain contemporary texts. This type of scientific inquiry is inappropriate under *Burke*, 234 U.S. at 679, but, in any event, the Tenth Circuit badly misread these texts in its pursuit of statutory ambiguity.

First, the court of appeals cited a dictionary definition of coal as an " 'amorphous' " substance containing " 'hydrocarbons,' " which the court construed as a reference to methane in coal. Pet. App. 16a (citing *Funk & Wagnalls New Standard Dictionary of the English Language* 508 (1913)). But that very dictionary defines "amorphous" as lack of a crystalline structure, *Funk & Wagnalls* at 94, which is a characteristic of solid coal. Stach, *supra*, at 87. Moreover, solid coals are composed of many different hydrocarbons. *Coal Handbook*, *supra*, at 11. There is no basis for the court's suggestion that a reference to "hydrocarbons" in "amorphous" coal is a reference to methane gas. Certainly the author of that entry did not understand coal to include gas; the next sentence (omitted by the Tenth Circuit) describes coal as "brittle, compact, massive, and sometimes laminated . . . ." *Funk & Wagnalls* at 508.

Second, the court found significant that coal was said to have a " 'variable composition' " that cannot be so readily defined as crystallized mineral rock. Pet. App. 17a. But this is a well-known point of distinction between the *organic rock* coal (composed of macerals of different origin and chemical and physical properties) and *inorganic rock*. Stach, *supra*, at 87. It has absolutely nothing to do with gas.

Third, the court relied upon a statement that marsh gas is "present in considerable quantity in coal, in a dissolved or occluded state. . . ." VI *Encyclopedia Britannica* 575

(1910). Something "present in" coal is not part of the coal itself.

Fourth, the Tenth Circuit placed heavy reliance on an 1873 text characterizing " 'coal' as 'embrac[ing] all classes of mineral fuel that will ignite and burn with flame or incandescent heat,' " and " 'ranging through all the grades of coal, from the hard, dense anthracite to the asphaltic varieties, and from the solidified petroleum to the gaseous naphtha.' " Pet. App. 17a (citing IV *American Cyclopaedia* 726 (Ripley and Dana eds., 1873)). This archaic definition of "coal" as including all mineral fuels no longer prevailed by 1909. See VI *Encyclopedia Britannica* 575 (1910). Not surprisingly this description of coal—which is broad enough to encompass even oil and gas—was omitted from the entry in the *1883* version of the same encyclopedia on which the Tenth Circuit relied; the more recent edition properly defines coal as "a black, opaque, inflammable substance, generally hard and compact." IV *American Cyclopaedia* 726 (Ripley and Dana eds., 1883). Certainly neither Congress nor the Department of Interior used the term "coal" to refer to all mineral fuels in 1909.[23]

Finally, the Tenth Circuit relied on the same 1873 source's statement that in bituminous coal " 'hydrogen is the predominating element, in its [coal's] gaseous or volatile constituents, though both oxygen and hydrogen are generally present in such coals in nearly equal parts.' " Pet. App. 17a (quoting IV *American Cyclopaedia* at

[23] Even in the nineteenth century, Congress expressly recognized the distinction between coal and the mineral fuel petroleum by clarifying that the latter was subject to the Mining Law of 1872, which was inapplicable to coal. Act of February 11, 1897, ch. 216, 29 Stat. 526; *Union Oil*, 249 U.S. at 346. As noted previously, just prior to 1909 Congress also specifically rejected bills that would reserve not only coal but also the distinct minerals oil, gas, and asphalt. *See supra* at 5 & n.1. Interior also had long distinguished between, for example, petroleum and coal. *Union Oil Co. (On Review)*, 25 Pub. Lands Dec. 351 (1897); *see also* II Department of Interior, *Mineral Resources of the United States, Calendar Year 1908* 5, 17, 345 (1909) (distinguishing coal from other mineral fuels).

726). The Tenth Circuit failed to grasp that this discussion is about the respective proportion of hydrogen and oxygen in the different kinds of *solid* coal (*i.e.*, bituminous caking coal has slightly more hydrogen than oxygen in its elemental composition, though the proportions are almost equal, whereas subbituminous block or cannel coal is more oxygenated). IV *American Cyclopaedia* at 726 & table on 727. Hydrogen and oxygen (which after all are gases in standard atmospheric conditions) are "gaseous and volatile constituents" in the sense that they are matter in the solid coal that will be released as a gas when solid coal is burned. See VI *Encyclopedia Brittanica* 575-76 (1910). This discussion likewise has nothing to do with natural gas in coalbeds.

Thus, the Tenth Circuit's analysis of the chemistry of coal was not only inappropriate under *Burke*, but wrong. Coalbed gas was not, and is not, commonly considered to be a constituent of coal. No ambiguity whatsoever exists in the statutory reservations, much less a " 'grievous ambiguity,' " *Muscarello*, 118 S. Ct. at 1919, that would justify application of the rule that ambiguous public grants are construed against the grantee. Congress reserved only the solid rock coal in the 1909 and 1910 Acts.

C. The Tenth Circuit's Analysis Of The Nature Of Coalbed Methane And Damage To Coal From Its Extraction Is Irrelevant And Wrong.

Because "coal" is not an ambiguous word, and does not connote gas, the other considerations raised by the Tenth Circuit are legally irrelevant. They are also unpersuasive.

As an initial matter, the Tenth Circuit's approach is passing strange. Rather than analyze what Congress actually meant by "coal," it engages in speculation as to how Congress would have treated coalbed gas had it given it some thought. See Pet. App. 19a-20a ("it seems to us quite unlikely that Congress, if it had considered the matter," would have severed coalbed gas). This kind of conjecture is far short of "evidence that Members of

Congress actually understood" the reservation of coal to include coalbed gas. *Utah Div. of State Lands*, 482 U.S. at 207; *Amoco Prod. Co.* v. *Village of Gambell*, 480 U.S. 531, 548 (1987) ("Although language seldom attains the precision of a mathematical symbol, where an expression is capable of precise definition, we will give effect to that meaning absent strong evidence that Congress *actually intended* another meaning.") (emphasis added).

In any event, nothing in the Tenth Circuit's analysis justifies the inference that Congress intended the term "coal" to encompass coalbed gas. The court of appeals focused first on the "physical state [of coalbed gas] prior to extraction," Pet. App. 19a, claiming baldly that "there was enough undisputed information about the unique nature of CBM" that Congress would have distinguished it from other natural gases. Pet. App. 17a-18a. Not only is this scientific speculation immaterial under *Burke* because it does not shed light on the ordinary meaning of "coal," but it is also dubious in its own right. Even scientists of the time recognized that "little is known as to the condition of [methane] gas in the coal," Horace C. Porter & F. K. Ovitz, *The Escape of Gas From Coal* 3 (Bureau of Mines Technical Paper 2, 1911) (J.A. Vol. 2, at 510); Rollin T. Chamberlin, *Notes on Explosive Mine Gases and Dust* 16-17 (U.S.G.S. Bulletin 383, 1909) (J.A. Vol. 2, at 433-34) (discussing three "hypotheses" on possible conditions of gas in coal). With the benefit of modern science, the Solicitor of Interior in a 1990 opinion concluded that the state of coalbed methane *in situ* does not differentiate it from other natural gases, Pet. App. 165a, and there is no basis for surmising that anyone would have thought differently in 1909. Indeed, as discussed earlier, *supra* at 12-13, coalbed gas is no different from any other natural gas; it is the same at the burner tip for the consumer, and there is nothing unique about its generation or storage. Besides, it is fanciful to impute to Members of Congress views on an esoteric scientific subject that was never discussed in the 1909 or 1910 Act debates, or to speculate

further that a practical-minded Congress interested in mineral development would have distinguished coalbed gas from other natural gas based on its understanding of the "sorption" process.

The Tenth Circuit also found it unlikely that Congress would have reserved coal without coalbed gas because allegedly such gas could only be extracted in 1909 by crushing or heating coal. Pet. App. 20a & n.13. According to the Tenth Circuit, "in 1909 there appears to have been no technology by which a patent holder could extract and capture CBM from coal without damaging or destroying coal," Pet. App. 20a-21a, and "without bringing large volumes of coal to the surface." Pet. App. 20a n.13. This is just false. First, the Tenth Circuit has confused extraction of natural gas from coalbeds with scientific experiments involving crushing mined coal samples, see Chamberlin, *supra*, J.A. Vol. 2 at 433-34, and with the manufacture of gas by burning solid mined coal (a process known as gasification of coal), see Pet. App. 20a & n.13 (citing Larry L. Anderson & David A. Tillman, *Synthetic Fuels from Coal* (1979)). Second, although various techniques have been developed to enhance the productivity of wells, coalbed gas can be extracted simply by drilling into the coalbed and relieving subsurface pressure. Indeed, the most famous coalbed methane well in the Fruitland Formation, completed in 1953, was an open-hole well dug with no stimulation of the coalbed, Pet. App. 169a n.6; Fassett, *supra*, at 142, an age-old conventional practice prevalent in 1909. It was possible then, as it is now, to "extract CBM while leaving most of the coal relatively undisturbed." Pet. App. 20a n.13.

Regardless, any concern about damage to coal has no bearing on title. Damage to one estate from the extraction of a mineral owned by another is endemic to split estates. Because such estates were common on private lands, the law of split mineral estates was well settled by the time Congress enacted the 1909 and 1910 Acts. See *Chartiers Block Coal Co.* v. *Mellon*, 25 A. 597, 599 (Pa. 1893) (oil and gas owner entitled to drill through coal

owned by another); 2 Curtis H. Lindley, *Treatise on American Law Relating to Mines and Mineral Lands* § 827 (Arno Press 1972) (2d ed. 1903). That law, known as the accommodation doctrine, provides for reasonable reciprocity—the owner of one mineral may make reasonable use of other minerals to extract his own, and he in turn must allow reasonable use of his estate by his counterpart. See, *e.g.*, *Chartiers*, 25 A. at 599; 6 *American Law of Mining* § 200.04[1], at 200-20 (2d ed. 1998). Unreasonable use of another's estate subjects the wrongdoer to legal liability, both in equity and in law. *Id.* at 200-23.

Indeed, at the time it was common for owners of oil and gas rights to drill through another's coal to reach deposits under the coal seam. See George S. Rice et al., *Oil & Gas Wells Through Workable Coal Beds* 5 (Bureau of Mines Bulletin 65, 1913). Such drilling inherently causes damage to the coal. For example, a pillar of coal had to be left around the well to support it; leakage from a gas well could cause hazards for coal miners, including explosions; and drilling might cause surface water to flood into the mines. See *id.* at 5, 9, 11-12, 24-31. The possibility of damage did not mean that the gas and coal estates were inseverable. The accommodation doctrine forces parties to work out consensual solutions or face the prospect of damages for unreasonable exercise of their rights. Coal owners could also seek equitable protection in advance. See *Monongahela River Consol. Coal & Coke Co.* v. *Greensboro Gas Co.*, 38 Pa. C. 151, 156-57 (1910) (requiring driller to cement casings along the well bore to prevent leakage from gas well into the coal). Regulation also can protect the respective estates; for example, Department of Interior regulations and oversight currently preclude unreasonable damage to the coal estate or coal operations from oil and gas drilling. Pet. App. 176a-177a; see also Rice, *supra*, at 38-90 (detailing 1913 conference of state regulators and mining interests convened by the Bureau of Mines to develop uniform state laws for accommodation of the two estates).

No greater commercial damage is done by drilling a well to a target within, rather than underneath, the coal formation; indeed, coal owners often profit from CBM extraction, because it saves them the cost of ventilating the mine. Mavor, *supra*, J.A. Vol. 1, at 222-24; Memorandum to John R. Kunz from William P. Diamond, Department of Interior Geologist (Jan. 13, 1993) (District Court Docket Entry 623; Amoco Summary Judgment Appendix Vol. II, Exh. 136). Had Congress considered the issue of extraction, there is every reason to believe that it would have deemed the accommodation doctrine adequate to protect the rights of both estates.[24]

But the fact of the matter is that none of the considerations identified by the Tenth Circuit informed Congress' judgment in 1909. That does not mean that the Coal Lands Acts are ambiguous with respect to ownership of coalbed gas. Congress reserved only the solid rock "coal," and plainly intended to convey all other minerals to the patentee, in keeping with the rule that "title once passed was free from all conditions of subsequent discoveries of mineral." *Shaw* v. *Kellogg*, 170 U.S. 312, 332-33 (1898).

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[24] The Tenth Circuit discounted the accommodation doctrine of *Chartiers* by invoking a later Pennsylvania case, *United States Steel Corp.* v. *Hoge*, 468 A.2d 1380 (Pa. 1983), which construed a grant of coal to convey coalbed gas. But that case, as the Department of Interior has acknowledged, is based on idiosyncracies: namely, Pennsylvania's geology and its "stratum" theory of minerals ownership. Pet. App. 169a-171a. The "stratum theory" of ownership is inconsistent with the federal regime where Congress reserved specific minerals between 1909 and 1916. *Western Nuclear*, 462 U.S. at 49. *Hoge* and the other cases relied on by the Tenth Circuit turn on state law and the language and rules of construction of private deeds, and have no bearing on the meaning of Congress' reservation of "coal" in the 1909 and 1910 Acts (as even the panel below admitted). Pet. App. 76a n.17. *See, e.g., Rayburn* v. *USX Corp.*, No. Civ. A 85-G-2661-W, 1987 Westlaw 470907, at *3 (N.D. Ala. July 28, 1987) (reservation of gas did not reserve CBM where coal seams were required to be "encased and grouted off"). *But cf. Carbon County* v. *Union Reserve Coal Co.*, 898 P.2d 680, 687 (Mont. 1995) (coalbed gas is gas, not coal).

Coalbed gas is an unreserved mineral that, like all natural gas, belongs to the patentee.

CONCLUSION

The judgment of the court of appeals should be reversed.

Respectfully submitted,

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ADDENDA

ADDENDUM A

NAMED PETITIONER CLASS MEMBERS

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Helen L. Miller, deceased; Thomas S. Morrissey; Thomas J. Morrissey; Emil Mosbacher; Emil Mosbacher III; John David Mosbacher; R. Bruce Mosbacher; Myra Theresa Moulds; North Central Oil Corporation; H.L. Oliver; Clara Onofrio; Margaret C. Pargin; Harold F. Payne, Jr.; Neville G. Penrose; Ben M. Peterson, Jr.; Frederick Petrocco; Phillips Petroleum Company; James M. Raymond; W. E. Rennie, named as: the Heirs of W. E. Rennie, deceased; Thomas C. Romolo; Benton E. Smullyen; Clinton I. Smullyen; William Stirling; J. L. Tatum, named as: the Heirs of J.L. Tatum, deceased; Anna Carleo Tomeo; Ernest Tomeo; Turner Securities; Richard W. Turner, Sr.; George C. Vance, named as: the Heirs of George C. Vance, deceased; Anthony H. Veto; Joseph F. Ware, Jr.; Albert E. Zarlengo; John Doe and all other unknown persons claiming an interest in the mineral estate located within the N/2 of section 12, T33N, R8W, N.M.P.M., La Plata County, Colorado; Amax Oil & Gas, Inc.; Bowen/Edwards Associates, Inc.; Fuel Resources Development Company; Mobil Oil Corporation; National Cooperative Refinery Association; Northwest Pipeline Corporation; Palo/Eagle Joint Ventures; Richmond Petroleum, Inc.; Williams Production Company; John Doe Oil Company and all other unknown persons or entities claiming leasehold working interests or operating rights to explore for, produce or develop coalbed methane or coal constituents from coal or coal strata reserved by the United States in patents issued under the Act of March 3, 1909, or the Act of June 22, 1910, for lands located within the exterior boundaries of the Southern Ute Indian Reservation, and which entities have not obtained tribal consent to and federal approval of said exploration, production or development activities; Class of Defendants situated similarly to those named non-governmental defendants who claim ownership of an interest in coalbed

methane and other coal constituents or claim the right to explore for, develop or produce those substances from coal or coal strata reserved by the United States in patents issued under the Act of March 3, 1909, or the Act of June 22, 1910, for lands located within the exterior boundaries of the Southern Ute Indian Reservation and which class members have not obtained tribal consent to and federal approval of said interests of rights; Jack Balle; J.M. Huber Corporation, Oil & Gas Division; Mary Jean Balle; Donald C. Ciancio; Susie M. Ciancio; NCNB Texas National Bank, as trustee of the Kelly Cox Testamentary Trust; Addie G. Crosby; Jack W. Crosland, Jr.; Henry L. Enochson; Mary Jane Enochson; J.L. Goggans; Liberty Tulsa, as trustee of the Christine J. Hamilton Trust; Helen Crosland Hendricks; Thomas L. Johnstone; James Eric Kaindl; Larry James Kaindl; Lisa Jean Kaindl; Jane P. Mosbacher, named as: the Heirs of Jane P. Mosbacher, deceased; PM Associates, a Colorado general partnership; First Interstate Bank of Denver, as Co-trustee of the Estate of W.E. Rennie est W.E. Rennie; Roderick L. Turner; Wells Fargo Bank, as trustee of the George C. Vance Trust; Albert E. Zarlengo, Jr., as trustee for the Albert E. Zarlengo Trust; J. Magness, Inc.; Mosbacher U.S.A., Inc.; Land Owners Coalseam Committee.

ADDENDUM B

RECORD CITATIONS TO EXCERPTS FROM CERTAIN PUBLISHED MATERIALS CITED IN THIS BRIEF

IV *American Cyclopaedia* (1873)
Court of Appeals Docket Entry 1/19/98 [1097738], Tribe's Supplemental Brief: Rehearing En Banc, Tab 7

IV *American Cyclopaedia* (1883)
Court of Appeals Docket Entry 2/5/98 [1104928], Defendant Class' Response Brief in the En Banc Proceeding, Tab A

American Dictionary of the English Language (1889)
Court of Appeals Docket Entry 2/5/98 [1104928], Defendant Class' Response Brief in the En Banc Proceeding, Tab A

II *Century Dictionary and Cyclopedia* (1906-09)
Court of Appeals Docket Entry 2/5/98 [1104928], Defendant Class' Response Brief in the En Banc Proceeding, Tab C

III *Century Dictionary and Cyclopedia* (1906-09)
Court of Appeals Docket Entry 2/5/98 [1104928], Defendant Class' Response Brief in the En Banc Proceeding, Tab C

V *Century Dictionary and Cyclopedia* (1906-09)
Court of Appeals Docket Entry 2/5/98 [1104928], Defendant Class' Response Brief in the En Banc Proceeding, Tab C

VI *Encyclopedia Britannica* (1910)
Court of Appeals Docket Entry 2/5/98 [1104928], Defendant Class' Response Brief in the En Banc Proceeding, Tab E

Funk & Wagnalls New Standard Dictionary of the English Language (1913)
Court of Appeals Docket Entry 2/5/98 [1104928], Defendant Class' Response Brief in the En Banc Proceeding, Tab F

II *New English Dictionary On Historical Principles* (1893)
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IV *New English Dictionary On Historical Principles* (1901)
Court of Appeals Docket Entry 2/5/98 [1104928], Defendant Class' Response Brief in the En Banc Proceeding, Tab N

VI *New English Dictionary On Historical Principles* (1908)
Court of Appeals Docket Entry 2/5/98 [1104928], Defendant Class' Response Brief in the En Banc Proceeding, Tab N

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Rollin T. Chamberlin, *Notes on Explosive Mine Gases and Dust* (U.S.G.S. Bulletin 383, 1909)
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Horace C. Porter & F.K. Ovitz, *The Escape of Gas From Coal* (Bureau of Mines Technical Paper 2, 1911)
Court of Appeals Docket Entry 3/28/95 [843705], Appellants' Appendix Vol. Eight, at 1789.

George S. Rice et al., *Oil & Gas Wells Through Workable Coal Beds* (Bureau of Mines Bulletin 65, 1913)
Court of Appeals Docket Entry 3/28/95 [843705], Appellants' Appendix Vol. Six, at 1144.

Supreme Court, U.S.
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No. 98-830

IN THE
Supreme Court of the United States
OCTOBER TERM, 1998

AMOCO PRODUCTION COMPANY,
on behalf of itself and the class it represents,
Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,

and

BRUCE BABBITT, Secretary of the
United States Department of the Interior, *et al.*,
Respondents.

**On Writ of Certiorari to the
United States Court of Appeals
for the Tenth Circuit**

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QUESTION PRESENTED

Whether, in reserving to the United States "coal" in lands patented under the 1909 and 1910 Coal Lands Acts, 30 U.S.C. §§ 81, 83-85, while passing the surface land and all other minerals (including natural gas) to the patentee, Congress reserved only the solid rock fuel commonly known as "coal," but not natural gas in coal formations.

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BRIEF FOR RESPONDENT SOUTHERN UTE INDIAN TRIBE

STATEMENT OF THE CASE

Petitioners seek to overturn a decision of the Tenth Circuit holding that Respondent owns coalbed methane, a constituent of its coal. In passing the Coal Land Entry Acts of 1909 and 1910, Congress permitted nonmineral patenting of lands classified as valuable for coal, but retained federal ownership of the underlying coal beds. Act of March 3, 1909, ch. 270, 35 Stat. 844 (codified at 30 U.S.C. § 81) ("1909 Act"); Act of June 22, 1910, ch. 318, 36 Stat. 583 (codified at 30 U.S.C. §§ 83-85) ("1910 Act") (together "the Acts").[1] The limited patents issued to nonmineral entrymen under the 1909 Act, on which Congress modeled the 1910 Act, reserved to the United States "all coal in said lands, and the right to prospect for, mine, and remove the same." Both Acts provided for the subsequent federal disposition of the reserved "coal deposits" and the associated development rights. As a result of congressionally authorized restoration in 1938, the Southern Ute Tribe ("Tribe") owns the coal deposits located under approximately 200,000 acres of land within the Southern Ute Indian Reservation ("Reservation") and the related prospecting, mining and removal rights Congress reserved in the Acts. Pet. Br. 1.[2]

By virtue of the Acts' reservations, the Tenth Circuit found that the Tribe owns the coalbed methane ("CBM")

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[1] The Appendix to Petition for Certiorari contains a copy of the codified versions of the Acts (Cert. Pet. App. 133a-136a). The Appendix to Respondent's Brief in Opposition sets forth the Acts as originally enacted (R. App. 1a-5a).

[2] The boundaries of the Reservation, confirmed by Congress in 1984, include the lands at issue in this case, which are a remnant of the aboriginal lands of the confederated Ute bands initially recognized by the United States in 1868. *See* Act of May 21, 1984, Pub. L. No. 98-290, § 3, 99 Stat. 201.

contained within and commercially extracted from its coal by Petitioners.[3] In contrast, Petitioners deny that coal contains gaseous or liquid constituents, and also suggest that even the solid components of coal not valuable as combustible fuel are not "coal." Petitioners thus claim that they own the CBM, the inherent moisture and any other non-carbon substances extractable from the Tribe's coal because Congress did not reserve those substances under the Acts. Pet. Br. 36 n.18.

The Tenth Circuit found the term "coal" ambiguous and resolved that ambiguity in the Tribe's favor in accordance with the long-standing rule of statutory contruction interpreting ambiguities in public land grants in favor of the sovereign. The Tribe maintains that the Acts as a whole confirm that Congress reserved coal in its complete, unmined and natural condition, inclusive of inherent gases, liquids and all organic and inorganic contituents, and that the statutory term "coal" is ambiguous only if viewed in isolation.

In reserving "coal deposits," Congress relied upon the United States Geological Survey ("U.S.G.S.") classification system, which identified valuable coal strata by depth, thickness and quality. Congress viewed coal deposits as identifiable property boundaries within which the subsequent coal estate owner would receive exclusive rights, including the right to dispose of or ventilate the CBM required for development of the coal. Indeed, the CBM at issue in this case is indisputably a part of the coal beds identified by the U.S.G.S., even if not falling within the novel and impractical definition of "coal" that Petitioners promote. As owner of the "coal deposits," the Tribe possesses the right to invade the coal beds for the purpose of commercial

[3] CBM refers to the extractable substances contained within the Tribe's coal, which after removal assume a gaseous physical state under conditions of surface temperature and atmospheric pressure.

extraction of substances, such as CBM, contained within the "coal deposits."[4]

Origin of this Litigation. The Tribe generally does not disagree with the Petitioners' characterization of the facts that led to institution of this litigation. However, the Tribe strongly disagrees with Petitioners' description of the opinion of the Solicitor, *Ownership of and Right to Extract Coalbed Gas in Federal Coal Deposits,* No. M-36935, 88 Interior Dec. 538 (1981) ("1981 Solicitor's Opinion") (Cert. Pet. App. 140a-159a). *See* Pet. Br. 13-14. Rather than being the result of careful examination of the Acts, the 1981 Solicitor's Opinion was the result of Amoco's ex parte efforts to obtain the reversal of certain U.S.G.S. decisions denying applications for permits to drill CBM wells under federal oil and gas leases. C.A. App. Vol. 9, at 2038, 2039 (C.A. Doc. Entry 3/28/95 [843705]). Petitioners also fail to acknowledge that title opinions written in anticipation of drilling into tribal coal deposits regularly warned Amoco and other companies that, despite the 1981 Solicitor's Opinion, ownership of CBM remained uncertain (Cert. Pet. App. 80a n.20). Beginning in the late 1980s, the Tribe publicly made very clear that it disagreed with the applicability of the 1981 Solicitor's Opinion within the Reservation boundaries. Commencing in 1988, the Department of the Interior approved 162 communitization agreements that oil and gas companies signed, and which expressly reserved the Tribe's CBM rights. C.A. App. Vol. 9, at 2072, 2073 (C.A. Doc. Entry 3/28/95 [843705]). Petitioners' assertion that they relied in good faith on the 1981 Solicitor's Opinion in commencing CBM extraction

[4] As the appeals court observed, "At issue here is the ownership of CBM trapped in and produced from the coal reservoir" (Cert. Pet. App. 18a n.8). The Tribe does not claim ownership of natural gas located in non-coal strata, even though in a prior geologic era it may have been excess CBM generated and expelled by slowly maturing coal deposits.

on the Reservation obscures the fact that they were fully aware of the continuing questions related to CBM ownership and proceeded with extraction nevertheless.

Historical Disposition of Public Lands. As westward expansion proceeded following the Civil War and for half a century thereafter, Congress maintained a consistent national policy prohibiting agricultural settlers from obtaining patents to lands known to contain valuable minerals. Desert Land Act of March 3, 1877, ch. 107, § 2, 19 Stat. 377 (codified at 43 U.S.C. § 322) ("Desert Land Act"); Act of June 21, 1866, ch. 127, § 1, 14 Stat. 67 (codified at 43 U.S.C. § 201, *partially repealed by* Act of October 21, 1976, Pub. L. No. 94-579, 90 Stat. 2787) ("Mining Act of 1866"); Act of July 1, 1864, ch. 205, § 1, 13 Stat. 343 ("Coal Lands Sales Act of 1864"); Act of May 20, 1862, ch. 75, §§ 1, 2, 12 Stat. 392 (codified at 43 U.S.C. §§ 161-62, *partially repealed by* Act of October 21, 1976, Pub. L. No. 94-579, 90 Stat. 2787) ("Homestead Act"); Act of September 4, 1841, ch. 16, § 10, 5 Stat. 453, 455-56. Lands containing coal were not subject to agricultural entry. *Mullan v. United States,* 118 U.S. 271, 277 (1886); Decision of Commissioner General Land Office (Sept. 22, 1908), J.A. Vol. I, at 285-89.

By 1909, Congress had established a system of public land disposition that turned upon the classification of land, the principal categories of which were coal, non-coal minerals and agriculture. Whether under the Desert Land Act, the Act of March 3, 1873, ch. 279, 17 Stat. 607 (codified as amended at 30 U.S.C. §§ 71-76) ("Coal Lands Sales Act of 1873"), the General Mining Law of 1872, or the Homestead Act, the successful patentee received fee simple absolute title. In passing the 1909 and 1910 Acts, Congress for the first time permitted agricultural entrymen to receive limited patents to designated coal lands, subject to a reservation of the coal estates for

future disposition. Until passage of the Stock-Raising Homestead Act of 1916, which reserved all minerals from patents to agricultural land, land classification determined the vehicle by which agricultural entrymen, coal land entrymen or non-coal mineral claimants could obtain fee simple title to public land. Act of December 29, 1916, Pub. L. No. 64-290, ch. 9, 39 Stat. 862 ("SHRA").

Historically, Congress disposed of coal lands separately from lands valuable for other minerals and prescribed minimum prices for the fee simple title to coal land acreage that were higher than those assessed for other public lands. Coal Lands Sales Act of 1873, § 1; Coal Lands Sales Act of 1864, § 1. Under President Theodore Roosevelt's administration, the Department of the Interior increased by up to 1500 percent the price per acre for coal land acreage. *Coal-Land Laws and Regulations Thereunder,* 35 Pub. Lands Dec. 665 (1907); *Coal Lands—Character of Land—Evidence,* 34 Pub. Lands Dec. 194 (1905); *Sales of Coal Lands—Rules and Regulations,* 1 Pub. Lands Dec. 687 (1882); *Classification and Valuation of Coal Lands,* 37 Pub. Lands Dec. 653 (1909) (Cert. Pet. App. 137a).

Two years after passage of the first Coal Lands Sales Act of 1864, Congress enacted the intial comprehensive law addressing disposal of hard rock, non-coal minerals. Act of July 26, 1866, ch. 262, 14 Stat. 251. Supplementary legislation embodied in the Placer Mining Act of 1870 and the General Mining Law of 1872 authorized the patenting of all public lands containing "valuable mineral deposits" other than coal deposits, either through lode location or placer claim. Act of May 10, 1872, ch. 152, 17 Stat. 91; Act of July 9, 1870, § 12, ch. 235, 16 Stat. 217. The mineral patentee, like the coal land patentee, received fee simple absolute title.

At the turn of the century, oil and gas were viewed as associated minerals treated under the general heading of "petroleum." The Petroleum Lands Act of 1897 confirmed that placer patenting was permissible for petroleum-bearing lands. Act of February 11, 1897, ch. 216, 29 Stat. 526. Properly classified coal lands were not available for gas placer patenting. The Department of the Interior strictly applied this well-established rule, which demonstrates that CBM was not considered petroleum. *See, e.g., Ohio Oil Co. v. Kissinger,* 60 Interior Dec. 342 (1949); *Ohio Oil Co. v. Kissinger,* 58 Interior Dec. 753 (1944); *H. W. Rowley,* 58 Interior Dec. 550 (1943).

The U.S.G.S. Classification System and Study of Coal. The U.S.G.S. classification system and coal lands designation practices are the underpinnings of the Acts. Prior to the creation of the U.S.G.S., the General Land Office supervised the classification and surveying of the public lands. Act of March 3, 1849, ch. 108, 9 Stat. 395; *see generally* C. ALBERT WHITE, A HISTORY OF THE RECTANGULAR SURVEY SYSTEM (1926-1991). Government exploration and surveying of western lands, by such notable personages as Major John Wesley Powell, revealed not only the unparalleled natural resources of the West, but also a tremendous need for a governmental inventory of the public's vast holdings. PAUL W. GATES, HISTORY OF PUBLIC LAND LAW DEVELOPMENT 419-34 (1968) ("Gates"); BENJAMIN H. HIBBARD, A HISTORY OF THE PUBLIC LAND POLICIES 500-01 (1924). In 1879, Congress created the U.S.G.S. and assigned it responsibility for "the classification of the public lands and examination of the Geological Structure, mineral resources and products of the national domain." Act of March 3, 1879, ch. 182, § 1, 20 Stat. 377, 394 (codified as amended at 43 U.S.C. § 31).

Classification of coal land required extensive surface reconnaissance, geological mapping and coal sampling. *See, e.g.,* Arthur J. Collier, *Geology and Coal Resources*

of the Cape Lisburne Region, Alaska, U.S.G.S. Bulletin 278, H.R. Doc. No. 59-826, at 5 (1906). The evolution and increasing sophistication of U.S.G.S. geological reconnaissance dramatically redefined the evidence needed to support coal land designation. *See Coal Lands—Character of Land—Evidence,* 34 Pub. Lands Dec. 194 (1905) (Secretary of the Interior directing Commissioner of the General Land Office to accept extrinsic evidence of coal beds rather than actual exposure of commercially valuable coal on each tract). *Compare Diamond Coal & Coke Co. v. United States,* 233 U.S. 236, 245-49 (1914), *and Colorado Coal & Iron Co. v. United States,* 123 U.S. 307, 325 (1887). This marked departure from prior land classification practices expanded the geographic area of coal lands and, accordingly, reduced the area available for agricultural entry. *See Lands Classified As Coal—Practice—Burden of Proof,* 36 Pub. Lands Dec. 215, 216 (1907) ("the conclusion must largely depend upon the geological formation of the lands in question . . . .").

Additionally, the scientific testing of coal samples for potential fuel value and the development of new coal utilization technologies widened the spectrum of coal deposits considered commercially valuable. *See* Act of February 18, 1904, ch. 160, 33 Stat. 15, 33 (authorizing the U.S.G.S. to evaluate different coals and "the most economic method for their utilization for different purposes . . . ."). For example, the invention of the "gas producer-generator" demonstrated that gases derived through coal distillation held great potential for future use in internal combustion engines. Marius R. Campbell, *Contributions to Economic Geology 1906, Part II—Coal, Lignite, and Peat,* U.S.G.S. Bulletin 316, H.R. Doc. No. 59-823, at 12 (1907), J.A. Vol. II, at 414 ("Campbell"). Between 1904 and 1910, the U.S.G.S. tested the fuel values of 195 samples of coal, including bituminous coals, lignites and peats from 28 dif-

ferent states. Robert H. Fernald, *The Status of the Gas Producer and of the Internal-Combustion Engine in the Utilization of Fuels* 16, U.S. Bureau of Mines, Technical Paper 9 (1912) ("Fernald"). The U.S.G.S. testing program also included elaborate analysis of the phenomenon by which coal holds occluded methane. Rollin T. Chamberlin, *Notes on Explosive Mine Gases and Dust*, U.S.G.S. Bulletin 383, H.R. Doc. No. 60-1538 (1909) ("Chamberlin"), J.A. Vol. II, at 415; *see also* Horace C. Porter & F. K. Ovitz, *The Escape of Gas From Coal*, U.S. Bureau of Mines, Technical Paper 2 (1911) ("Porter & Ovitz"), J.A. Vol. II, at 508. The efforts of the U.S.G.S. contributed to a comprehensive understanding of coal and influenced the coal land classification system.

Executive Withdrawal of Coal Lands From Entry. Congress passed the 1909 and 1910 Acts in direct response to administrative actions that substantially expanded the recognized coal lands of the United States and thereby reduced the amount of land available for homestead entry and patenting. Between July 26 and November 12, 1906, President Theodore Roosevelt authorized several Secretarial orders that removed approximately 66 million acres of western lands from all forms of entry. Gates at 725-29. As explained by President Roosevelt:

> I have temporarily withdrawn from settlement all the lands which the Geological Survey has indicated as containing, or in all probability containing, coal. . . . The coal, like the forests, should be treated as the property of the public and its disposal should be under conditions which would inure to the benefit of the public as a whole.

President Theodore Roosevelt's Sixth Annual Message (Dec. 3, 1906), *reprinted in* XV THE WORKS OF THEODORE ROOSEVELT 342, 362-63 (1926). The temporary withdrawals freed the U.S.G.S. from immediate development pressures while completing coal land determinations.

On December 17, 1906, the Roosevelt administration softened western political outcry by reopening the withdrawn lands to non-coal entry; however, if the U.S.G.S. subsequently classified those lands as coal land prior to patent, such entries would be for naught. *See* Gates at 727; Decision of Commissioner General Land Office (Sept. 22, 1908), J.A. Vol. I, at 285; *Nonmineral Applications For Lands Classified As Coal*, 38 Pub. Lands Dec. 181 (1909). Once classified as coal land, the exclusive authority for its disposition rested in the Coal Lands Sales Act of 1873, under which fee title was sold for increased acreage prices. *Classification and Valuation of Coal Lands*, 37 Pub. Lands Dec. at 653, 654 (Cert. Pet. App. 137a, 138a). The coal land conservation policy reflected by withdrawal and reclassification imposed obvious hardships on agricultural entrymen.

Coal, Coal Mining and Coal Utilization. Coal is found "'always as a thin sheet or stratum, extending through the hills as far as the hills extend, and inclosed between similar sheets of other kinds of rock.'" *Coal Lands—Character of Land—Evidence*, 34 Pub. Lands Dec. at 201 (quoting J. P. LESLEY, MANUAL OF COAL AND ITS TOPOGRAPHY). As Representatve Mondell observed in 1910:

> That coal extends under considerable areas of land is a matter beyond all dispute and controversy. Geological horizons, running unbroken through large areas of territory, carry with them unbroken, undiminished coal veins, so that it is not difficult to determine approximately the probable extent and area of coal lands.

45 CONG. REC. 6044 (1910) (statement of Rep. Mondell).

Coal is a sedimentary rock comprising a complex mixture of organic and inorganic substances resulting from the decomposition and compaction of plant material over geologic time. The process of progressive evolution of coal, known as coalification, produces a highly variable,

complex and heterogeneous mixture of compounds, which includes solids, liquids and gases. All coal contains predominately carbonaceous material and is readily combustible. *See generally* Affidavit of Stephen L. Bend, J.A. Vol. I, at 298-309 ("Bend Aff."); Affidavit of Jeffrey R. Levine, J.A. Vol. I, at 342-53 ("Levine Aff."); Affidavit of Dr. Harry Marsh, J.A. Vol. I, at 370-98 ("Marsh Aff."); THE COAL HANDBOOK (Robert A. Meyers ed., 1981), J.A. Vol. II, at 543-52; Jeffrey R. Levine, *Coal Composition, as Related to the Mode of Occurrence of "Coalbed Methane"* (1992), J.A. Vol. II, at 579-611 ("Levine Report").

Like other solids, such as wood, coal is an extremely porous substance. Most of the space or porosity within coal, however, cannot be seen because the dimensions of the pores are only slightly larger than small molecules. Marsh Aff. ¶ 3.10, J.A. Vol. I, at 376-77. The microporosity in coal results from the irregular stacking of some molecules during the coalification process. *Id.* Coal's micropores are not empty, however, but rather are filled with other molecules, such as CBM, generated during the coalification process. *Id.*, ¶ 4.3.1, J.A. Vol. I, at 379.[5]

The coalification process produces methane in coal. M. Duel & A. Kim, *Methane Control Research, Summary of Results, 1964-1980,* U.S. Bureau of Mines, Bulletin 687, at 25 (1984). "Methane is a component part of coal that is formed during the coalification process . . . ." M. G. Zabetakis et al., *Methane Control in United States Coal*

[5] Petitioners assert a recent study shows 60 per cent of coalbed methane "migrated *into* the coal seam." Pet. Br. 12 (citing Andrew R. Scott et al., *Thermogenic and Secondary Biogenic Gases, San Juan Basin, Colorado and New Mexico—Implications for Coalbed Gas Producibility,* 78 AAPG BULLETIN 1186, 1206 (1994). The article discusses the formation and migration of gases *within* the Fruitland coal formation and does *not* discuss or suggest that gas formed in noncoal geologic formations migrated into coal on the lands in question.

Mines—1972, U.S. Bureau of Mines, Information Circular 8600, at 6 (1973). "Methane is always present in coal . . . ." Ann C. Kim, *Estimating Methane Content of Bituminous Coalbeds From Adsorption Data,* U.S. Bureau of Mines, Report on Investigations 8245, at 1 (1977). Indeed, "bituminous coal," which is the rank of coal underlying the Tribe's Reservation, Levine Aff. ¶ 21, J.A. Vol. I, at 349-50, has been defined by the Department of the Interior as "[a] coal with a relatively high proportion of *gaseous constituents*; dark brown to black in color and burns with a smoky luminous flame." *A Dictionary of Mining, Mineral and Related Terms* 106, U.S. Bureau of Mines (1968) (emphasis added).

Coal also contains as part of its structure water generated during the coalification process. Marsh Aff. ¶ 3.11, J.A. Vol. I, at 377. The moisture inherently contained within the coal structure is universally recognized as a constituent of coal. Levine Report, J.A. Vol. II, at 582-83. The inherent moisture in coal can be removed after coal is mined; however, the Federal Government requires that the weight of mined coal include its inherent moisture content for certain tax purposes. *See Amax Coal Co. v. United States,* 128 F.3d 613 (7th Cir. 1997).

CBM and inherent moisture are held in coal in essentially the same manner. Marsh Aff. ¶ 4, J.A. Vol. I, at 378-81. Both are "grid-locked" within the macromolecular structure of the coal and cannot move to adjacent microporous sites because those micropores are also occupied. *Id.* The internal trapping mechanisms of coal render it relatively impermeable unless the coal is fractured. Affidavit of J. Craig Creel, ¶ 9, J.A. App. Vol. I, at 332 ("Creel Aff."). While coal contains some natural fractures, the porosity in coal consists principally of the micropores. Marsh Aff. ¶ 3.10, J.A. Vol. I, at 376-77. Measurable electric forces also bind the water and methane molecules to the surfaces of the macromolecular matrix;

however, the strength of the bond is greater for water than for CBM. Marsh Aff. ¶¶ 5, 6, J.A. Vol. I, at 381-96. The internal trapping and bonding of CBM within coal is known as adsorption or sorption. *Id.*

The disturbance of coal in the process of mining liberates CBM, a "hazardous, highly explosive gas . . . ." Affidavit of James T. Cooper ¶ 4, J.A. Vol. I, at 322 ("Cooper Aff."). Because of the dangers posed by liberated CBM, ventilation is one of the most important aspects of coal mining. Certainly without controlling CBM, coal could not be developed. *Id.* ¶ 6, J.A. Vol. I, at 323; VI ENCYCLOPAEDIA BRITANNICA 587 (11th ed. 1910); *see also* 30 U.S.C. § 863 requiring all coal mines to be ventilated). "[M]ethane continues to escape from coal even after it is mined, [and] steps must be taken to ensure adequate ventilation as the coal is transported . . . ." Cooper Aff. ¶ 7, J.A. Vol. I, at 323; Porter & Ovitz, J.A. Vol. II, at 510 ("gas escapes from coal not only during the breaking down of the coal in the mines, but also continuously for a long time after the coal is mined.").

Coal is a multi-purpose resource and not just a solid fuel. Marsh Aff. ¶ 7 ,J.A. Vol. I, at 396-97. From the 1880s until the mid-1960s, a substantial percentage of mined coal was used for the production of coal-gas or town-gas for both lighting and heating. *Id.* Prior to passage of the Acts, Congress authorized and demonstrated its awareness of improvements in the recovery of gases from mined coal of different varieties. Those improvements made lignite, a poor quality coal, valuable for power producing purposes. *Hearings on Coal Lands and Coal-Land Laws of the United States Before the House Committee on the Public Lands,* 59th Cong., 17-19 (1907) (testimony of Marius R. Campbell, U.S.G.S.) ("Campbell Testimony").

Liquefaction of coal produces liquid fuels such as gasoline, and coal-tar, a product of coking, has long been used

as the raw material in the chemical industry for a wide range of products. Marsh Aff. ¶ 7.1, J.A. Vol. I, at 396. The underground gasification of coal, which requires the ignition of a coal seam and the injection into the coal seam of steam, air or oxygen, is a recognized means for recovery of fuel gases from coal. Harry Perry, *The Gasification of Coal,* 230 SCIENTIFIC AMERICAN (1974), J.A. Vol. II, at 530. Methane is "among the first components to emerge" in underground gasification. *Id.*, J.A. Vol. II, at 532. The Department of the Interior recognizes underground coal gasification as permissible under federal coal leases—not federal oil and gas leases—even though the product of the process is gas. 30 C.F.R. § 206.264 (1997); *see In Situ Gasification of Coal,* No. M-36890, Opinion of Regional Solicitor, Denver (May 10, 1977), Gower Federal Service (Min) SO-1 (1979).

CBM Development. The storage of CBM in coal deposits differs from the storage of natural gas in conventional gas reservoirs. The great majority of CBM in a coal deposit is sorbed, whereas in a conventional gas reservoir the majority of gas exists in a free state. Matthew J. Mavor, *Overview of Coal Gas Reservoir Structure, Fluid Dynamics, and Completion Technology* (1993), J.A. Vol. I, at 188, 197. "In the unconventional coalbed methane reservoir of the Fruitland formation, a minimum of 95% of the gas exists in the sorbed state within the macromolecular matrix of the coal." Creel Aff. ¶ 6, J.A. Vol. I, at 331; *see also* Dudley D. Rice et al., *Coalbed Gas—An Undeveloped Resource, reprinted in The Future of Energy Gases,* U.S.G.S. Professional Paper 1570, at 389, 394-95 (1993). Because of the relative impermeability of coal, reductions of pressure in coal formations do not result in the free movement of fluids throughout the coal the way fluids move in conventional gas reservoirs. Creel Aff., Figure 2, J.A. Vol. I, at 337. To produce CBM commercially, it must diffuse from within the macromolecular

structure of coal, and that diffusion is governed by a law of physics generally not applicable to conventional gas reservoirs. *Id.* ¶¶ 4.1-9, J.A. Vol. I, at 329-32.

The general production profile of CBM wells also reflects the difference in size of the porosity occupied by CBM in coal when compared to the pore size in conventional gas formations. "A single methane molecule residing in a 1 millimeter-diameter pore [conventional reservoir] has the same 'aspect ratio' as a pin *point* (not a pin head) in a football field; whereas the microporosity in coal is barely larger than the sorbate molecules [CBM] that reside within it." Levine Report, J.A. Vol. II, at 610. "Pores in conventional reservoirs are as much as a million times larger than the 'pores' in coalbed reservoirs." Levine Aff. ¶ 28(D), J.A. Vol. I, at 353.

Commercial production of CBM involves three basic phases. The first step, drilling into the coal bed and installing production tubing, provides an open conduit through which reservoir fluids may move to the surface. The second stage, completion and stimulation, increases the interface between the well bore and the coal bed. *Id.* ¶¶ 26, 27, J.A. Vol. I, at 351-52. Because the natural fracture networks in the Tribe's coal beds are generally water-filled, pumping of the CBM wells, the third phase, serves to remove the coal bed water to facilitate CBM production. *Id.* ¶ 27, J.A. Vol. I, at 352. With equipment capable of removing 2,500 barrels of water per day from each CBM well, tremendous volumes of produced water must be disposed of, and evaporation facilities or underground injection wells have been developed for that purpose. William F. Clark & Tom Hemler, *Completing, Equipping, and Operating Fruitland Formation Coal-Bed Methane Wells in the San Juan Basin, New Mexico and*

Colorado (1988), J.A. Vol. II, at 553, 570, 573-75 ("Clark & Hemler").[6]

The two methods of CBM well completion are "open hole" and "cased hole." The open hole completion technique involves the injection of highly pressurized air and water to blow out a spherical cavity or room in the coal bed at the bottom of the well bore. *Id.*, J.A. Vol. II, at 555-57. "Up to 100 tons of solid coal may be removed from the well bore by this technique." Creel Aff. ¶ 14, J.A. Vol. I, at 334. In a cased hole completion, perforated well casing is cemented into the coal bed. Clark & Hemler, J.A. Vol. II, at 556, 560-61. Regardless of the completion technique, however, the continuous removal of small pieces of coal, known as "coal fines," which may vary in size from dust-like particles to chunks of coal, accompanies CBM production. *Id.*, J.A. Vol. II, at 562-64. CBM operators often stimulate the coal bed in order to expand the coal's natural fractures. The stimulation process includes the injection of thousands of gallons of stimulation fluid, such as hydrochloric acid, nitrogen foam, or gelled water into the coal. In attempting to prop the artificially stimulated fractures, producers introduce as much as 120,000 pounds of sand per well under high pressure into the coal bed. Creel Aff. ¶¶ 16, 17, J.A. Vol. I, at 334-35.

Nonconventional Fuels Tax Credit Program. Petitioners have claimed millions of dollars in federal income tax credits based upon the distinction between CBM production and conventional gas production. In association with enactment of the Crude Oil Windfall Profit Tax Act of

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[6] In recent months, the discovery of underground coal fires in dewatered portions of the Tribe's Reservation has triggered concern by La Plata County officials that the removal of water from coal has permitted oxidation and spontaneous combustion of the coal. *County Seeks to Avert Coal-bed Fires*, DURANGO HERALD (Oct. 25, 1998).

1980, and in an effort to reduce the nation's dependence on imported oil, Congress authorized significant tax credits for production of nonconventional fuels, including gas produced from "geopressured brine, Devonian shale, coal seams and tight formations." Act of April 2, 1980, Pub. L. No. 96-223, § 231(a), 94 Stat. 229 (codified as amended and redesignated at 26 U.S.C. § 29) ("Section 29"). In enacting Section 29, Congress gave no indication whatsoever as to its views on the ownership question presented by this case; however, the Section 29 tax credit program directly contradicts the assertions of Petitioners and supporting amici that it is impractical or onerous to distinguish between the gaseous constituents of coal and conventionally produced gas. Pet. Br. 40; *see, e.g., Brief of Amici Curiae States of Montana, New Mexico, North Dakota, Utah and Wyoming in Support of Petitioners* at 4.

Even in those instances in which a single well bore penetrates multiple gas-producing zones, commingling production does not defeat qualification for the tax credit, so long as the taxpayer employs industry-standard engineering "establish[ing] which portion of the production from the single bore is attributable to the qualified formations." Bruce N. Lemons, *IRS Rulings Further Clarify the Availability of the Nonconventional Fuel Credit*, 79 J. TAX'N 170, 172 (1993). The same evidence establishing that the source of produced gas is a coal seam for purposes of claiming tax credits also differentiates CBM for ownership purposes under the 1909 and 1910 Acts.[7] Typical evidence submitted by tax credit claimants to establish that Section 29 production comes from a coal seam includes: "the well-completion report, a radioactivity, electric, or other log defining the coal seam . . . ." Judith M. Matlock & Laurance E. Nemirow, *Section 29 Credits Under a Cloud: Tax Court Renders Rev. Rul. 93-54 Meaningless*, 88 J. TAX'N 37, 38 (1998).

[7] There is no evidence in this case of production through a single well bore of commingled CBM and conventional natural gas, and public records reveal no such multiple completions within the Tribe's Reservation.

In administering the Section 29 tax credit program, the Internal Revenue Service ("IRS") relied upon the Federal Energy Regulatory Commission, which turned to state and other jurisdictional agencies to establish the location of qualified formations. See *Marathon Oil Co. v. Federal Energy Regulatory Comm'n*, 68 F.3d 1376 (D.C. Cir. 1995). Significantly, until the Colorado Oil and Gas Conservation Commission ("COGCC") adopted Order No. 112-60 on June 17, 1988, for lands involved in this case, the COGCC treated the coal-bearing Fruitland formation and the adjacent Pictured Cliffs sandstone formation as one producing zone. Based upon testimony provided in 1988 to the COGCC by industry representatives, the COGCC found that "gas produced from the Fruitland coal seams has different chemical characteristics from gas produced from within the Fruitland sandstone or the Pictured Cliffs sandstone and should be considered a separate source of supply." COGCC Order No. 112-60, Finding 4 (June 17, 1988). In issuing its operational order for the Fruitland coal formation, the COGCC expressly warned that its orders did "not effect [sic] any claim on ownership of the gas." COGCC Order No. 112-61, Finding 3. M (Aug. 15, 1988).

Section 29 credits are "available only to a taxpayer who holds an ownership interest in the property from which the qualified fuel is produced." Dennis J. Grindinger, *The Section 29 Credit and EOR Credit: Two Major Tax Incentives Affecting The Development of Natural Resources*, 37 ROCKY MTN. MIN. L. INST. 18-1, 18-3 (1991) (citing S. REP. No. 96-393, at 88 (1979)). The IRS does not require that the facility for producing CBM be a vertical oil and gas well, but rather has permitted coal owners to claim the credit in association with vertical and

horizontal coal bed ventilation shafts. *Id.* at 18-16 (citing IRS Letter Ruling 9044073 (August 8, 1990)); *see also* Judith M. Matlock & Laurance E. Nemirow, *Section 29 Credits Under A Cloud: Tax Court Renders Rev. Rul. 93-54 Meaningless,* 88 J. TAX'N 37, 38 n.4 (1998) (citing 18 C.F.R. § 274.205(c) (since repealed)).[8]

SUMMARY OF ARGUMENT

The statutory texts of the 1909 and 1910 Acts, each read as a whole, confirm that when Congress reserved from limited, nonmineral patents "all coal in said lands, and the right to prospect for, mine, and remove the same," it reserved all coal in the ground, in its natural condition, where it unquestionably contains CBM. While that should end the matter, Petitioners have focused on definitions of the single word "coal" that refer generally to its solid nature to conclude that Congress intended to convey to nonmineral patentees the gaseous, liquid and noncombustible components of coal. Petitioners are wrong. Contemporaneous definitions and descriptions of coal confirm that in 1909 and 1910 coal was commonly understood to contain "occluded" gases, liquids and inorganic matter. The remaining portions of the statutory texts confirm the limited nature of the rights that Congress intended to grant to nonmineral patentees and that Congress did not intend to convey to nonmineral patentees any commercial extraction rights associated with coal.

The development of the Acts, as reflected in legislative reports and hearings, confirms that Congress passed the statutes for the dual purposes of conserving the coal resources of the nation for subsequent use and of permitting

[8] In order to conserve energy resources and reduce the emission of "green house" gases, Congress has urged federal agencies and coal owners to recover CBM in association with coal mining. 42 U.S.C. § 13336. The Environmental Protection Agency is also now engaged in a "Coalbed Methane Outreach Program," which encourages coal mine operators to recover CBM for commercial purposes. Website: yosemite.epa.gov/methane/home.nsf/Lookup.

agricultural settlement on the surface of western lands classified as containing valuable coal resources. In direct response to the executive withdrawal from entry of approximately 66 million acres of potential coal lands and in recognition that subsequent coal land classification would prevent nonmineral entry, Congress severed the coal estates from the remainder of the lands and authorized nonmineral patentees to receive title to the non-coal estates. The circumstances surrounding passage of the Acts and their purposes demonstrate that Congress did not intend to convey commercial CBM development rights to nonmineral patentees. Like the mineral estates reserved in subsequent legislation, the coal estates reserved in 1909 and 1910 were broad in scope. To construe the Acts as having divided the right to develop CBM from the remaining coal estate would have defeated Congress' intentions by hindering future coal development.

Should the Court conclude that the Acts are ambiguous after consideration of the statutory language, the circumstances surrounding passage, and legislative statements of the dual purposes of the Acts, then it should apply the public land law canon of construction that grants are not construed against the United States in the absence of plain language of conveyance. In reviewing the complete terms of the reservation, "all coal in said lands, and the right to prospect for, mine, and remove the same," Congress retained and did not convey the right to extract CBM from reerved "coal deposits."

ARGUMENT

I. THE ENTIRE TEXTS OF THE 1909 AND 1910 ACTS CONFIRM THAT CONGRESS RESERVED UNMINED COAL AS IT NATURALLY OCCURS, INCLUSIVE OF CBM, TOGETHER WITH EXCLUSIVE COMMERCIAL EXTRACTION RIGHTS.

The language of the 1909 and 1910 Acts severs with precision the real property interests in the designated coal

lands at issue in this case. Examination of the isolated term "coal" without consideration of all other provisions contained in the Acts does not correspond with the stated intentions of Congress. *See Department of Revenue of Or. v. ACF Indus., Inc.*, 510 U.S. 332, 343 (1994) (provision in isolation often clarified by remainder of statutory scheme). As with other statutes, the entirety of the Acts must be reviewed to understand statutory intent. *Smith v. United States*, 508 U.S. 223, 229 (1993).

A. Similarities and Differences in the 1909 and 1910 Acts.

The texts of the 1909 and 1910 Acts show that they are almost identical with respect to the language of grant and reservation, and for purposes of the question before the Court, detailed review of the 1909 Act's complete text, without duplication of analysis of similar provisions in the 1910 Act, is the most efficient means to present the various matters addressed by the Tribe. In summary, however, the most significant differences between the two Acts are: a) the 1910 Act expanded on the 1909 Act by permitting limited agricultural patenting of lands that had already been classified as coal lands prior to entry (1910 Act, § 1); b) unlike the 1909 Act, which conditioned coal resource development upon compensation to the agricultural patentee for "all damages," the 1910 Act limited damage compensation to losses of crops and improvements occasioned by coal resource recovery (1910 Act, § 3); and c) agricultural entrymen choosing to challenge the classification of coal land under the 1910 Act faced a more difficult burden than did challenging entrymen under the 1909 Act (1910 Act, § 3). Under both Acts, however, Congress intended to reserve all coal in the ground and all development rights with respect to the coal deposits, including the right to extract CBM.

B. The 1909 Act—"An Act for the Protection of the Surface Rights of Entrymen".

The 1909 Act, on which Congress modeled the 1910 Act, contains three sentences, one of which contains two provisos, and each of which uses the term "coal." The first sentence of the 1909 Act states:

> *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That any person who has in good faith located, selected, or entered under the *nonmineral land laws* of the United States any lands which *subsequently are classified,* claimed, or reported as being *valuable for coal,* may, *if he shall so elect,* and upon making satisfactory proof of compliance with the laws under which such lands are claimed, receive a patent therefor, which *shall contain a reservation to the United States of all coal in said lands, and the right to prospect for, mine, and remove the same.*

1909 Act, cl. 1 (R. App. 1a) (emphasis added). In keeping with the historic prohibition of agricultural entry onto known mineral lands, Congress extended the benefits of the 1909 Act only to persons who "in good faith" had considered the lands to be agricultural prior to their entry. Had such persons complied with the homestead laws and received patents before the discovery of valuable coal deposits underlying their lands, they would have received the title to subsequently discovered coal and all other minerals. *Deffeback v. Hawke*, 115 U.S. 392, 402 (1885). Such was not the case, however, because prior to the issuance of patents under the nonmineral land laws, and notwithstanding the significant personal and financial investment of the hometeaders, the lands had, in fact, been "classified, claimed or reported as being valuable for coal." Prior to 1909, the harsh consequence of the discovery of valuable coal beds prior to patent was the ouster of the agricultural entryman from the lands, unless the entryman prevailed in administrative proceedings on the question of

whether the lands contained valuable coal. *Nonmineral Application For Lands Classified As Coal,* 38 Pub. Lands Dec. at 181-82.

In the 1909 Act, Congress provided a previously unavailable option to the nonmineral entryman confronted with a subsequent report of valuable coal: "[I]f he shall so elect," the nonmineral entryman may "receive a patent therefor, which shall contain a reservation to the United States of all coal in said lands and the right to prospect for, mine, and remove the same." By the complete terms of the reservation Congress left no doubt that the reserved interests included "all" undiscovered, unmined and unremoved coal in the ground and the right to develop that resource. Thus, Petitioners' contention that Congress intended to reserve a resource corresponding to " 'air-dried' (that is, *gas-free*) sample[s]" is unsustainable. Pet. Br. 26. *See* Porter & Ovitz, J.A. Vol. II, at 510 ("gas escapes from coal . . . continuously for a long time after the coal is mined.").

1. *The Terms Of The Reservation.*

a. "all coal in said lands". This Court has stated that it affords "nontechnical words and phrases" their "ordinary meaning." *Smith,* 508 U.S. at 228. The phrase "all coal in said lands" means unmined coal in its natural condition where it unquestionably contains CBM.

Assuming arguendo, that the meaning of the phrase "all coal in said lands" turns solely on the word "coal," that term should be construed according to common usage reflected in contemporaneous dictionaries and encyclopedias. Contrary to Petitioners' contentions, contemporary dictionaries and encyclopedias described coal as including gases and liquids. A general encyclopedia of the era specifically observed: "Gases, consisting principally of light carburetted hydrogen or marsh gas [CBM], are often present in considerable quantity in coal, in a dissolved or occluded state . . . ." VI ENCYCLOPAEDIA BRITANNICA *Coal*

575 (11th ed. 1910); *accord* III AMERICANIZED ENCYCLOPAEDIA BRITANNICA *Coal* 1643 (1890). Another common encyclopedia defined the mineral coal as "a compound especially of carbon or of decomposed woody matter, with inflammable substances and hydrogen and oxygen gases." IV THE AMERCAN CYCLOPAEDIA: A POPULAR DICTIONARY OF GENERAL KNOWLEDGE *Coal* 726 (Ripley & Dana eds., 1883). That same work differentiated between types of bituminous coal by noting that when it contains a "moderate proportion of inflammable gases it is dry coal; with more bitumen it becames fat coal. . . ." *Id.* An earlier edition of that encyclopedia had noted that in bituminous coal "hydrogen is the predominating element, in its gaseous or volatile constituents, though both oxygen and hydrogen are generally present in such coals in nearly equal parts." IV THE AMERICAN CYCLOPAEDIA: A POPULAR DICTIONARY OF GENERAL KNOWLEDGE *Coal* 726 (Ripley & Dana eds. 1873). Numerous dictionaries of the era defined "marsh gas," "methane," and "fire-damp" as gases contained within or released by coal. Pet. Br. n.13 (citing III THE CENTURY DICTIONARY 2229 (1906-09); V *id.* at 3740; UNIVERSAL ENCYCLOPAEDIC DICTAONARY 1837, 2637, 2696 (1905); IV NEW ENGLISH DICTIONARY 243 (1901); VI NEW ENGLISH DICTIONARY 188 (1908)).

Against this overwhelming evidence that coal was commonly understood to include gaseous constituents, Petitioners contend that, because coal was generally described as a "solid rock," this Court should disregard contemporaneous common knowledge of its components. *Id.* at 22-25. Use of the term "solid"—one not employed by Congress— refers to the gross, bulk properties of coal and is not a description of the physical state of coal's component parts. Given the exhaustive examination in this case of the porosity of coal and the presence of CBM and inherent moisture within that porosity, Petitioners cannot

seriously contend that coal is a solid in the sense that it is "without an internal cavity." WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY *Solid* 2169 (1986). Rather, general descriptions of coal's solid nature refer to its "three dimension[][al]" character. *Id.* ("coal in place that has not been sheared, undercut, or similarly prepared for blasting."). By their focus on the term "solid," Petitioners cannot mean that coal is a crystalline substance. VII THE CENTURY DICTIONARY *Solid* 5759 (1895). In 1909, it was commonly known that, because of its "amorphous" nature and "variable composition," coal "cannot be as strictly defined as a crystalized or definite mineral can." VI ENCYCLOPAEDIA BRITANNICA *Coal* 575 (11th ed. 1910). In sum, contemporary descriptions of coal as a solid simply described its general nature and apearance, not the physical state of its components.

The common understanding of coal was consistent with the work of the U.S.G.S., particularly Chamberlin's study, reprinted by Congress in 1909, which recognized CBM as a component of coal. Chamberlin, J.A. Vol. II, at 415-72. Chamberlin performed several experiments with coal to gain a better understanding of coal's inherent gases. The experiments included the volumetric and qualitative measurement of gases released by lump coal, crushed coal and finely powdered coal. The analysis of gas obtained from coal tests showed that methane was "quantitatively by far the most important gas . . . [in] coal." *Id.*, J.A. Vol. II, at 448. In describing the results of his work, Chamberlin stated:

> The gas which escapes from coal may exist within the mass of the coal in three possible conditions. It may be mechanically held or imprisoned in minute pores, cavities, or cracks throughout the coal; it may be occluded or dissolved within the substance of coal; or it may be the result of slowly operating chemical reactions, such as those which have produced the coal from the original vegetable matter . . . . [T]here can

> be little doubt that the bulk of the gas given off from coal has arisen from the slow decomposition of organic matter . . . [and] the process which has converted vegetable humus into coal.

Id., J.A. Vol. II, at 433. Chamberlin's experiments demonstrated that CBM was not easily severable from coal, unless the coal was pulverized. *Id.*, J.A. Vol. II, at 445. Chamberlin's work confirms that the U.S.G.S., like common dictionaries and encyclopedias, did not treat coal as a substance devoid of gaseous constituents, and Petitioners have presented nothing demonstrating that Congress thought otherwise. Accordingly, even if the phrase "all coal in said lands" requires review of only the term "coal," the fact that coal contains "occluded" gaseous constituents was clear in 1909.

b. "the right to prospect for, mine, and remove". By the remaining terms of reservation, "the right to prospect for, mine, and remove the same," Congress reserved all rights needed to develop the underlying coal. The plain meaning of the verb "to mine" is:

1. To dig or burrow in or below the surface of, as of the earth . . . .
2. To make by burrowing, esp. underground; to furnish with underground passages.
3. To get, as metals, out of the earth by digging.
4. To dig into, for ore or metal.

WEBSTER'S NEW INT'L DICTIONARY OF THE ENGLISH LANGUAGE *Mine* 1374 (1916); *see also* THE UNIVERSAL ENCYCLOPAEDIC DICTIONARY *Mine* 2715 (1905) ("To dig . . . in the earth, for the purpose . . . of obtaining minerals. . . ."). By its use of the term "to mine" Congress expressly reserved in 1909 Act patents the exclusive right to dig into or extract natural constituents from the "coal in said lands." To drill or dig into "coal in said lands" for the purpose of extracting CBM from that coal is precisely the right that Petitioners claim, in direct con-

travention of the patent reservation by which their predecessors obtained limited title.

Petitioners must concede that coal mining requires the exercise of dominion and control over CBM. The right to ventilate CBM found in coal beds was so well recognized that a leading legal commentator of the era questioned whether state governments could constitutionally prohibit mine operators from releasing CBM from coal mines without running afoul of constitutional restrictions on the taking of coal estates. III LINDLEY ON MINES § 863a (3d ed. 1914). Control of CBM in the course of coal mining ranged from primitive techniques involving ignition and explosion of accumulated gases in coal mines to use of refined ventilation devices and practices. *See* 1 DEXTER S. KIMBALL, BOOK OF POPULAR SCIENCE 412 (1952) (describing role of a "fireman" in igniting mine gases); VI ENCYCLOPAEDIA BRITANNICA *Coal* 587 (11th ed. 1910) (describing huge fans and shafts used to control "fire-damp" or CBM). The right to mine coal in 1909 and 1910 clearly included the power and the duty to exercise complete and absolute control over CBM and the right to waste it. Like the term "coal," the term "mine" should be contrued consistently with Congress' understanding as of the time of enactment, and the meaning of that term should not be restricted by recently realized values of CBM or recent technological advances in the *in situ* extraction of CBM from coal. *See Burke v. Southern Pac. R.R.*, 234 U.S. 669, 688 (1914) (" 'no better point to determine [title] than at time of issuing the patent.' " (quoting *Cowell v. Lammers*, 21 F. 200, 206 (D.Cal. 1884)).[9]

[9] The fact that the United States conferred ownership of the reserved coal estates upon the Tribe by a means other than patent should have no bearing on the Tribe's legal interests. *See Burke*, 234 U.S. at 703-04 (citing *Barden v. Northern Pac. R.R.*, 154 U.S. 288, 341 (1894)). In cases in which a tribe has established a prima facie case of ownership, Congress has placed the burden of proof upon those contesting the tribe's ownership interest. 25 U.S.C. § 194; *see Wilson v. Omaha Indian Tribe*, 442 U.S. 653 (1979).

The electing nonmineral entryman also agreed to forgo any right "to remove" the "coal in the lands." The CBM production processes employed by Petitioners require the removal of hundreds of tons of the Tribe's "solid" coal through each wellbore. Creel Aff. § 14, J.A. Vol I, at 334. While Petitioners may view the removal of the Tribe's coal merely as an incidental activity, such removal constitutes a direct violation of the conditions under which the patentee was permitted to remain on the premises. The additional terms of reservation, "the right of prospect for, mine, and remove the same," which Petitioners chose not to evaluate, confirm the broad scope of the coal estate that Congress reserved.

2. *The Remaining Provisions of the Statute—Relative Rights to Coal Deposits.*

In the second sentence of the 1909 Act, Congress set the parameters for future conduct between the nonmineral patentee and a subsequent coal owner with respect to the reserved coal estate and confirmed the availability of administrative appeals challenging coal classification for a nonmineral entryman choosing not to receive a limited, non-coal patent. Like the other provisions of the 1909 Act, the second sentence is critical to understanding Congress' intent.

> The *coal deposits in such lands shall be subject to disposal by the United States* in accordance with the provisions of the coal-land laws in force at the time of such disposal, but no person shall enter upon said lands to prospect for, or mine and remove coal therefrom, without previous consent of the owner under such patent, except upon such conditions as to security for and payment of all damages to such owner caused thereby as may be determined by a court of competent jurisdiction: *Provided, That the owner under such patent shall have the right to mine coal for use on the land for domestic purposes prior to the*

> *disposal by the United States of the coal deposit: Provided further,* That nothing herein contained shall be held to affect or abridge the right of any locater, selector, or entryman to a hearing for the purpose of determining the character of the land located, selected, or entered by him.

1909 Act, cl. 2 (R. App. 1a-2a) (emphasis added).

In providing that "[t]he *coal deposits* in such lands shall be subject to disposal by the United States . . .," Congress clearly contemplated subsequent disposition of reserved coal on an in place basis. The common meaning of the term "deposit" at the time of passage of the 1909 and 1910 Acts included sedimentary layers, such as coal beds:

> In *geol.* any mass of material which has been thrown down from, or moved and gathered together by, water . . . if the material be evenly and uniformly distributed, it would more generally be termed a *bed* or *layer*.

III THE CENTURY DICTIONARY 1545 (1914). The term of contemplated future disposition by the United States, "coal deposits," is synonymous with the term of reservation, "all coal in said lands." While Congress unquestionably retained the right to dispose of the reserved "coal deposits" in accordance with coal-land laws that might be subsequently enacted, the coal-land law then in place was the Coal Lands Sales Act of 1873, which provided for disposition of coal on an acreage, in place basis. As contemporaneously interpreted by the Department of the Interior, Congress contemplated continued disposition of reserved coal estates under the provisions of the Coal Lands Sales Act of 1873. *Agricultural Entries of Coal Lands—Act of June 22, 1910,* 39 Pub. Lands Dec. 179, 185 (1910). The coal estate patent to the coal entryman conveyed "all coal and the coal deposits in the land above described, together with the right to prospect for, mine

and remove the coal . . . ." *Id.*[10] The term "coal deposits" considered in light of U.S.G.S. classification practices conforms to the common definition: "these bedded deposits, generally of wide extent . . . differ from most other mineral deposits. . . ." *Coal Lands—Character of Land—Evidence,* 34 Pub. Lands Dec. at 201.

In clarifying the rights of surface patentees and those of subsequent coal estate owners, Congress provided:

> [N]o person shall enter upon said lands to prospect for, or mine and remove coal therefrom, without previous consent of the owner [nonmineral patentee] under such patent, except upon such conditions as to security for and *payment of all damages* to such owner caused thereby as may be determined by a court of competent jurisdiction . . . .

1909 Act, cl. 2 (R. App. 1a) (emphasis added). Thus, Congress assured the nonmineral patentee that before coal prospecting, mining or removal could commence on his land, either his consent would be obtained or he would receive security for "*all* damages" caused thereby. Applying Petitioners' construction of the term "coal" to this provision would require a coal developer to compensate the nonmineral patentee for the value of gas lost or wasted in the course of mining. This result, when measured against the whole statute and the purposes revealed by its terms, is absurd and contravenes the effect of Congress' comprehensive reservation of "all coal in said lands, and

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[10] In *Watt v. Western Nuclear, Inc.,* 462 U.S. 36, 54 n.14 (1983), this Court referred to the Department of the Interior's guidance set forth in *Alabama Coal—Lands—Act of April 23, 1912,* 41 Pub. Lands Dec. 32, 33 (1912), which indicated that there was at that time "no law which provides for the disposition of the coal in these lands." Care must be taken to distinguish between the specific situation in Alabama, where Congress had already precluded patenting, even of coal land, by any means other than the agricultural land laws and the situation in other portions of the country where the Coal Lands Sales Act of 1873 continued to be operative. Act of March 3, 1883, ch. 118, 22 Stat. 487 (1883).

the right to prospect for, mine, and remove the same." While intending to protect agricultural entrymen from all damages to the surface estate resulting from future coal mining, Congress certainly did not intend that the nonmineral owner, who had given up all claim to underground coal, would also receive compensation for CBM vented or flared in the course of coal mining.[11] *See* 1910 Act, § 3 (R. App. 4a-5a).[12]

Congress, having authorized future coal estate owners to utilize the surface estate, then addressed the rights of nonmineral patentees with respect to the underlying coal. The first proviso of the second sentence states:

> *Provided,* That the owner under such patent shall have the right to mine coal for use on the land for domestic purposes prior to the disposal by the United States of the coal deposit . . . .

Provisos, "generally . . . except something from the enacting clause, . . . or restrain its generality. . . ." *Minis v. United States*, 40 U.S. (15 Pet.) 423, 445 (1841). As exceptions to the general operation of the statute, pro-

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[11] Amici acknowledge the incongruity of the 1909 Act's compensation provisions and Petitioners' statutory interpretation, and in doing so implicitly recognize that the express statutory terms, rather than the common law "accommodation doctrine," establish the relative rights of surface patentees and coal estate owners under the Acts. *Brief of Amici Curiae the Coal Bed Methane Ad Hoc Committee, the Wyoming Independent Producers' Association and the Independent Petroleum Association of America In Support of Petitioners* at 26. Amici even suggest it may no longer be lawful for a coal owner to vent valuable CBM as a necessary incident of coal mining, but inexplicably dispense with these complications by stating they are "unnecessary to address at this time . . . ." *Id.*

[12] Unlike the 1909 Act, the 1910 Act limits damage compensation for coal prospecting to "the crops and improvements on such lands . . . ." *See, e.g., Kinney-Coastal Oil Co. v. Kieffer*, 277 U.S. 488 (1928) (construing similar provision under 1914 Act and denying surface damage claims). Because CBM did not pass to agricultural patentees under either Act, the distinction makes no difference in this case.

visos are strictly construed. *See, e.g., Bridges v. United States,* 346 U.S. 209, 216 n.14 (1953) (citing *United States v. McElvain,* 272 U.S. 633, 639 (1926)). This proviso grants limited permission for the nonmineral patentee to "mine coal," subject to clear restrictions on the location of and purpose for use and only until "disposal by the United States of the coal deposit." By direct implication, the first proviso of the 1909 Act prohibits any mining of coal by the nonmineral patentee following disposal of the coal deposits by the United States, which disposal occurred in this case in 1938. Further, during the period of permissive mining and use of coal by the nonmineral patentee, commercial exploitation of coal was impermissible. 1909 Act, cl. 2 (R. App. 1a) (permitting mining for "domestic purposes prior to disposal"). Congress plainly attempted in this proviso to prevent any dispute between a subsequent coal patentee and the nonmineral patentee with respect to the underlying coal by making it absolutely clear that the nonmineral patentee's permissive invasion of the coal beds terminated upon disposal of the coal deposits.

Petitioners misconstrue the first proviso by suggesting that it was merely confirmation of the nonmineral entryman's right to mine coal as an adjunct of agricultural title. Pet. Br. 25. They fail to recognize that the permissive right to mine coal for domestice purposes was an exception to the long-standing practice prohibiting agricultural entrymen from exploiting known mineral resources. The Department of the Interior, in construing the proviso's statutory counterpart in the 1910 Act, clearly viewed this permissive access to coal as an exception. *Alabama Coal Lands—Act of April 23, 1912,* 41 Pub. Lands Dec. 32, 33 (1912) ("Persons having homestead entries . . . obtain no right to mine coal therefrom, except for their own domestic use, as appears from the first proviso to section 3 of the act of June 22, 1910."). To be sure, because the

gaseous components of coal "escape[] from coal . . . continuously for a long time after the coal is mined," nonmineral patentees necessarily mined and removed lumps of coal containing CBM and burned all the combustible parts of coal, including CBM, in their stoves and furnaces. Porter & Ovitz, J.A. Vol. II, at 510. But because it was "dealing with a practical subject in a practical way . . .," *Burke*, 234 U.S. at 679, Congress terminated the nonmineral patentee's utilization of the coal beds upon subsequent disposal of the coal deposits. Instead of construing this proviso strictly, as required by *Bridges*, 346 U.S. at 216 n.14, Petitioners seek to create an additional exception to the Acts because technologies now exist that permit *in situ* extraction of CBM from coal. Congress, however, made no such additional exception until passage of the Enzi Act, which excludes from its operation the lands involved in this case. Pub. L. No. 105-367, 112 Stat. 3313 (1998).

The second proviso of the second sentence is fundamentally different in character from the first proviso and confirms the pre-existing right of a nonmineral patent applicant to contest the classification of coal land, and the final sentence of the 1909 Act establishes the burden of proof in such contests. In order to oust the nonmineral patent applicant, who had entered the land prior to coal land classification, the 1909 Act required the challenging party, most often the government, to show that the land was "chiefly valuable for coal."[13] The predecessors in title to the Petitioners in this case, however, elected to secure limited patents that reserved to the United States "all the coal in the land, and the right to prospect for, mine, and remove the same." Notice of Election, J.A. Vol. I, at 290.

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[13] The 1910 Act, which permitted limited agricultural entry and patenting following coal land designation did not retain this same burden, but rather required that the challenging nonmineral patent applicant "disprov[e][] such classification." 1910 Act, § 3 (R. App. 5a).

C. The Absence of Ambiguity in the 1909 and 1910 Acts.

In the Acts, Congress reserved "all coal in the lands" or "coal deposits." Petitioners' assertions notwithstanding, Congress did not indicate that the term "coal" was intended to mean a substance devoid of gases, liquids and non-combustible components. Both common definitions and technical works of the era specifically referenced coal's gaseous constituents. In equating the terms of reservation, "all coal in the lands," with the terms of future disposition, "coal deposits," Congress' intentions are best interpreted as references to the sedimentary strata or beds of coal underlying the lands. The simultaneous reservation of prospecting, mining and removal rights included the traditional and necessary control of CBM liberated by disturbed coal. The Acts read as a whole reveal no ambiguity on these points and resolve the question before the Court in favor of the Tribe.

II. THE PURPOSES OF THE LEGISLATION, THE SURROUNDING CIRCUMSTANCES, OTHER PUBLIC LAND LAWS, AND PRACTICALITY ALL CONFIRM THAT CONGRESS DID NOT INTEND TO CONVEY COMMERCIAL CBM RIGHTS TO NONMINERAL PATENTEES.

The texts of the 1909 and 1910 Acts authoritatively demonstrate that Congress did not intend to convey commercial CBM extraction rights to Petitioners' predecessors in title. *See Hubbard v. United States*, 514 U.S. 695, 702 (1995) (congressional language determinative). Legislative history, on which Petitioners place great reliance, does not contradict the statutory language, but rather confirms the broad scope of the coal estate reservations and the limited purpose of the nonmineral patents issued under the Acts. Pet. Br. 28-31. The circumstances surrounding enactment further indicate that Congress sought to protect the surface rights of nonmineral entrymen, but had no interest in dividing the commercial values obtainable from the nation's coal resources. *Robinson v.*

Shell Oil Co., 519 U.S. 337, 340-41 (1997) (considering historical context). Neither the interrelationship of the Acts with subsequent enactments nor the so called "practicality" of Petitioners' construction justifies abandonment of Congress' intentions expressed in the Acts.

A. Legislative Hearings and Debates.

Despite numerous issues regarding the coal industry discussed by Congress in the course of developing the Acts, the statutes addresed only two issues: the access of agricultural entrymen to designated coal lands and the continued protection of the nation's coal resources from improvident disposition. *See, e.g., Hearings on Coal Lands and Coal-Land Laws of the United States Before the House Committee on Public Lands*, 59th Cong., 1-18 (Dec. 17, 1906) (testimony of Edgar E. Clark) ("Clark Testimony"). Congressional discussions regarding the legislation support the Tribe's position in this case.[14]

Legislative history unequivocally shows that Congress did not define coal as Petitioners now would, that is, a substance devoid of liquids, gases and noncombustible components. *See, e.g.*, Campbell Testimony at 19 (discussing moisture content of North Dakota lignites); *Hearings on Coal Lands and Coal-Land Laws of the United States Before the House Committee on Public Lands*, 59th Cong., 3 (Jan. 11, 1907) (testimony of A. H. Brooks) (discussing ash content and partings in Alaska coals). Moreover, the U.S.G.S. had persuaded Congress that coal's value included its potential for use under advancing and yet-developed technologies. *Id.* ("It may be that gas will

14 "The legislation is unquestionably necessary and desirable, whether we view it from the standpoint of the reservation to the Government of the coal deposits in public lands until such time as there may be a demand for the deposits, or from the standpoint of the importance of providing for orderly development, settlement, reclamation and cultivation of the agricultural surfaces of the public domain." *Agricultural Entries on Coal Lands*, S. REP. No. 61-703, at 3 (1910).

finally be adopted generally—either gas from oil or gas from coal."). Congress relied upon the U.S.G.S. to decide what lands contained sufficiently-valuable coal resources to justify their designation as coal lands. *Agricultural Entries on Coal Lands*, H.R. REP. No. 61-377, at 3-4 (1910) ("[T]he exercise of judgment as to what constitutes . . . coal lands must rest with the administrative department of the Government."). In this respect, Congress resisted efforts to override U.S.G.S. coal land determinations. *Protection of Surface Rights of Entrymen*, H.R. REP. No. 60-2019, at 8 (1909) (views of Mr. Gronna, proposing exclusion of North Dakota lignite lands from classification); *Protection of Surface Rights of Entrymen*, S.R. REP. No. 60-1091, at 1 (1909) (proposing amendment excluding lignite from consideration). Congress adopted the U.S.G.S. classification methodology which rested not only upon the identification of coal beds, but also upon the potential value of the coal deposits. As reported by the House Public Lands Committee:

> [The legislation] proposes a separation which retains in the hands of the Government a mineral deposit the presence of which is known, or may be ascertained with reasonable certainty, by the proximity of coal croppings or the presence of known geological horizons carrying coal.
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> * * * *
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> It must be borne in mind that the coal underlying some classified lands, and those which may be classified in the future, is of a quality . . . that has no merchantable value at this time . . . . The Interior Department in making its classification has looked not only to the present but to the prospective coal value, and, therefore, all lands which are known to contain coal of workable thickness, or in the proximity of workable croppings, or in known coal areas where geological conditions render probable the existence

> of workable veins at reachable depths, are classified as coal lands.

H.R. REP. NO. [illegible]377 at 3-4.

In disregard of the broad scope of the coal reservations reflected by the language of the Act and the congressional reports accompanying their passage, Petitioners rely principally upon two bits of isolated colloquy in an effort to redefine coal. Pet. Br. 29-30. First, Petitioners maintain that Rep. Mondell's observation that Congress had chosen not to enlarge the coal reservation to include all minerals in the 1909 Acts should compel this Court to conclude that the non-solid constituents of coal were plainly conveyed to nonmineral entrymen. *Id.* (citing 43 CONG. REC. 2504 (1909)). Representative Mondell's statements, while reflecting a cautious approach to the use of mineral reservations, has no bearing on the expansive reservation of "all" coal deposits at issue in this case. Nor does Representative Mondell's subsequently expressed disapproval of proposals to also reserve petroleum mean that Congress intended to separate the components of reserved coal on a molecular level. Pet. Br. 30 (citing 45 CONG. REC. 6044 (1910)). To the contrary, those discussions confirm that Representative Mondell considered the reservation of coal deposits to include the identifiable coal beds for which the lands had been classified. 45 CONG. REC. 6044 (1910) ("geological horizons, running unbroken through large areas of territory").

In looking to legislative history as their guide to statutory interpretation, Petitioners assign no importance to statements describing the purpose of the limited patents granted under the Acts. The congressional reports and debates accompanying passage of the Acts, however, clearly indicate that Congress intended to open the surface of designated coal lands for agricultural development, and Congress never indicated that surface entrymen would be permitted to invade reserved coal beds for purposes of

commercial mineral extraction. *See* H.R. REP. No. 60-2019 at 4 ("[I]f we have no legislation, [nonmineral entrymen] would ultimately lose their lands and improvements, and it is imperative that legislation for their relief be had."); H.R. REP. No. 61-377 at 1 ("This bill provides for the opening to agricultural settlement and development the surface of lands which have been classified as coal lands . . . ."); *Agricultural Entries on Coal Lands*, S. REP. No. 61-703, at 2 (1910) ("The committee's effort has been to present a bill which would not only meet the conditions which exist, but one so carefully drawn as to make possible the settlement and development of the surface of such coal lands as are fit for agricultural purposes, while at the same time providing every possible safeguard against the acquirement of the surface of these lands for speculative purposes."). As Congressman Mondell stated, the entryman "relinquishes all rights and claim to the coal." 45 CONG. REC. 6152 (1910). The Acts were not intended to permit the entryman "to acquire any right whatever in the coal under the surface of the ground he settles upon . . . ." 45 CONG. REC. 6154 (1910) (statement of Rep. Butler). The legislative history contradicts rather than supports Petitioners' view that Congress granted nonmineral patentees the right to enter reserved coal deposits, long after their conveyance to third parties, in order to extract CBM for commercial purposes.

B. Circumstances Surrounding Passage of the Acts.

The 1909 and 1910 Acts were part of a larger national debate involving the conservation of the nation's natural resources for the future benefit of the public. *Leo Sheep v. United States*, 440 U.S. 668 (1979). While addressing coal land matters, the Roosevelt administration had also increased the size of the country's forest reserves by almost five times. *See* Gates at 580. Indeed, President Roosevelt and his successor in office, President Taft, also withdrew and reserved several million acres of petroleum lands. *Id.*

at 732-38; *see United States v. Midwest Oil Co.*, 236 U.S. 459 (1915).

The emergence of the conservation movement mirrors the specific history of coal resource protection addressed in the 1909 and 1910 Acts. The liberalization of evidence needed to support coal land classification reflected in the Secretary of Interior's 1905 decision, the withdrawal of western lands from entry in furtherance of coal land classification in 1906, and the dramatic increase of coal land acreage prices commencing in 1907 were each part of a comprehensive effort to protect the nation's coal resources and to dispose of them for the benefit of the public as a whole. *See Coal Land-Character of Land-Evidence*, 34 Pub. Lands Dec. at 194; Letter from Acting Secretary to Commissioner of the General Land Office (July 26, 1906), C.A. App. Vol. 6, at 1251 (C.A. Doc. Entry 3/28/95 [843705]); *Coal-Land Laws and Regulations Thereunder*, 35 Pub. Lands Dec. at 665.

Additionally, the geological and technical work of the U.S.G.S. with regard to coal resources revealed both an appreciation of coal's importance and a thorough knowledge of coal. As reported by the U.S.G.S. geologist Marius R. Campbell:

> [T]he Geological Survey has been giving more and more attention to the subject of coal, both as regards its geological relations and its technology. The need for information in both branches is imperative, for, although the amount of coal in the various fields seems so great as to be well nigh inexhaustible, the consumption of coal is increasing so rapidly that already the question of the future supply of fuel is a serious one and the Government is surely justified in using every means possible to conserve the supply for the use of future generations.

Campbell, J.A. Vol. II, at 404. In improving the efficient use of even low-grade coal, the U.S.G.S. developed

the "gas producer," a device that extracted through distillation—not combustion—the volatile gases of coal.

> The gas producer is an agency of conservation . . . . In States in which deposits of low-grade coal, lignite, and peat are found, the present cost of power, as developed by steam plants with coal that has been shipped a considerable distance, can be materially reduced by placing producer plants at the mines or bogs, so as to utilize these low-grade fuels without cost of shipment by generating electric current which can be easily transmitted to desired points within a wide radius.

Fernald, J.A. Vol. II, at 526. While the extraction of gases from coal for fuel purposes had not advanced sufficiently to capture the commercial value of CBM, the U.S.G.S. had completed detailed studies of the presence of "occluded" gases in coal. Chamberlin, J.A. Vol. II, at 415, 434. In a U.S.G.S. study completed shortly after Chamberlin's reported experiments, the U.S.G.S. confirmed the constituent nature of CBM in coal:

> In some cases the volume of gas liberated from broken coal is greater than the volume of *the coal itself—that is, of the actual solid and the cellular space combined* . . . . [M]ethane [is] either dissolved molecularly or adsorbed upon the inner surfaces of the cellular spaces.

Porter & Ovitz, J.A. Vol. II, at 511 (emphasis added). These circumstances confirm that Congress reserved CBM when it reserved the "coal deposits" in coal lands.

C. Historic Progression, Subsequent Legislation, and Disposition.

1. *Historic Progression.*

The language and purposes of the Acts and the conservation ethic of the era support the Tribe's position that Congress included CBM and the right to control CBM within the coal estate reservations of the 1909 and 1910

Acts. Prior to passage of the Acts, on classified coal lands, the coal land entryman received the entire fee simple estate and the nonmineral entryman obtained nothing. In departing from prior law and opening designated coal lands to agricultural settlement, Congress retained all underlying coal and all rights needed to prospect for, mine or remove coal, including the right to vent CBM. In interpreting the scope of the coal estate, this Court should construe the Acts and the Coal Lands Sales Act of 1873 in pari materia. Because Congress neither expressly nor by necessary implication chose to diminish the coal estate except for the temporary privilege to mine coal for domestic purposes, this Court should not recognize new reductions to the coal estate proposed almost a century later by Petitioners. *See Western Nuclear*, 462 U.S. at 36; *Leo Sheep*, 440 U.S. at 683.

Petitioners observe that the 1909 Act was the first in a series of public land statutes that progressively increased the types of specific mineral estates reserved from agricultural entrymen, until, upon passage of the SRHA, Congress took the final step and reserved all minerals from agricultural lands. Pet. Br. 31-36. They suggest that the "historical progression of public land statutes" requires this Court to construe the coal estate reservations narrowly since these Acts were the first steps encroaching onto the traditional domain of homesteaders. Petitioners' view of public land law disregards the significance of mineral classification, which set a starting point barring agricultural entry. At each major stage of conversion from a classification system to a full mineral reservation system, if land was known to contain a valuable mineral, Congress withheld that mineral estate from the agricultural settler. In permitting limited agricultural entry, mineral resources unknown or undiscovered passed to agricultural settlers as they always had. But the suggestion that a reserved estate of "all" coal, or "all" gas, or "all" oil should somehow be viewed narrowly in scope simply does not

follow from the fact that Congress later reserved all minerals from agricultural patents.

2. *Subsequent Legislation.*

Petitioners maintain that comparing the 1909 and 1910 Acts with mineral reservations in subsequent legislation involving other public lands reveals a congressional intent to exclude CBM from within the scope of coal estates reserved in the Acts. The Tribe disagrees.

a. The 1912 Act. In passing the 1912 Act, Congress permitted agricultural entrymen to obtain limited agricultural patents for certain lands in Utah identified as valuable for petroleum. Act of Aug. 24, 1912, ch. 367, 37 Stat. 496 ("1912 Act"). Congress provided that the limited patents under the 1912 Act would contain a reservation of "all the oil and gas in the lands so patented, together with the right to prospect for, mine, and remove the same . . . ." *Id.*, § 3. Unlike the coal estates reserved in the 1909 and 1910 Acts, the reserved petroleum estates under the 1912 Act were suspended from disposition pending subsequent legislation. *Id.* Because the Utah lands had not been classified as containing valuable coal resources, Congress declined to include a reservation of coal estates in the limited 1912 Act patents, thus permitting coal deposits, if any later be discovered, to pass to the agricultural entrymen. Congress gave no indication that the 1912 Act was somehow intended to limit the scope of coal estates reserved on the designated coal lands.[15]

b. The 1914 Act. In passing the 1914 Act, Congress followed the same pattern established in 1909, 1910 and

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[15] On the same day that Congress passed the 1912 Act, it also amended the Pickett Act of 1910 and confirmed that a withdrawal of land from mineral entry while the U.S.G.S. reclasssified land for one fuel mineral, such as oil, also withdrew such land from entry for another fuel mineral, such as coal. Act of August 24, 1912, ch. 369, 37 Stat. 497 (amending Act of June 25, 1910, ch. 421, 36 Stat. 847). This legislation eliminated any question of the need for double withdrawals by Interior.

1912 and opened for limited agricultural patenting lands that had been classified as valuable for specific enumerated minerals other than coal and precious metals. Act of July 17, 1914, ch. 142, 38 Stat. 509 ("1914 Act"). In the limited patents issued under the 1914 Act, Congress required a reservation of "all deposits on account of which the lands were withdrawn, classified, or reported as being valuable, together with the right to prospect for, mine, and remove the same." *Id.*, § 3. Again, the 1914 Act has no limiting effect upon the 1909 or 1910 Acts, yet Petitioners seize upon the enumeration of the specific mineral "gas" in the 1914 Act as a constraint on the scope of the coal estates reserved under the 1909 and 1910 Acts. There is nothing in the language or history of the 1914 Act suggesting that Congress' purpose in using the term "gas" in the 1914 Act was to limit the coal rights reserved under the 1909 and 1910 Acts. *See, e.g., United States v. Louisiana*, 394 U.S. 11, 19 (1969) (declining to link unrelated statutes). Because CBM was a commonly recognized constituent of coal in 1909 and 1910, the fact that it assumes a physically gaseous state upon extraction or that it might also fall within the broad definition of "all gas" on other lands, simply has no relevance to construction of the coal estate reservations at issue in this case.

The federal government's mineral patenting practices further confirm the absence of conflict between the Acts and subsequent "gas" reservations on other lands. One could not obtain a gas placer patent on designated coal land, unless the applicant disproved the existence of underlying coal. Thus, one seeking title under the General Mining Law of 1872 based upon the discovery of CBM would have had to disprove the existence of the very coal deposits from which CBM was being extracted in order to obtain any title. *See, e.g., Ohio Oil Co.*, 60 Interior Dec. at 342; *Ohio Oil Co.*, 58 Interior Dec. at 753; *H. W. Rowley*, 58 Interior Dec. at 550. The administration of

designated coal lands demonstrates that the conflict Petitioners seek to create between the Acts and subsequent statutes does not exist.

3. ***Disposition.***

The subsequent disposition of reserved coal estates, both before and after passage of the Mineral Leasing Act of 1920, is consistent with the broad reservation of all coal resources and related development rights reserved by Congress in the Acts, including the right to extract CBM for commercial purposes. Act of February 25, 1920, ch. 85, 41 Stat. 437 (codified as amended at 30 U.S.C. §§ 181-236) ("Mineral Leasing Act").

Although not mentioned by Petitioners, following passage of the Acts, the Department of the Interior authorized continued sale of coal estates, with payment to be made "at the price fixed for the whole acreage." *Agricultural Entries of Coal Lands—Act of June 22, 1910*, 39 Pub. Lands. Dec. at 185. The coal estate patent to the coal entrymen conveyed "*all coal and the coal deposits* in the land above described, together with the right to prospect for, mine and remove the coal . . . ." *Id.* (emphasis added). Interior's form of conveyance and its implementation of the language of the Acts leaves no doubt that the statutory terms of reservation as interpreted at the time included all coal as it lay in the ground. The coal estate patentee—not the surface patentee—received the right to exercise dominion and control over CBM. Contrary to Petitioners' contentions in this case, Congress did not intend the coal estate patentee's ownership interests in underground coal or the coal estate patentee's coal development rights to be any less than those enjoyed under coal lands patents issued under the Coal Lands Sales Act of 1873.

Unlike the coal estates reserved under the 1909 and 1910 Acts, which were subject to continuing patenting until 1920, other specific mineral estates subsequently re-

served in 1912 and 1914 were "subject to disposal by the United States only as shall be hereafter expressly directed by law." 1912 Act, § 3; 1914 Act, § 3. Congress authorized the disposition of these specific mineral estates only through federal leasing upon passage of the Mineral Leasing Act. Simultaneously, it revoked subsequent land patenting for most federal minerals and required that those mineral estates, including the coal estates reserved under the Acts, generally be disposed of through leasing. Particularly because the Mineral Leasing Act served as the exclusive vehicle for disposition of specific mineral estates reserved under the 1914 Act, courts have used it in construing the scope of those estates under the theory that Congress' intent to lease substances, such as non-hydrocarbon gas, reflects its intent to have reserved those substances. *See, e.g., Aulston v. United States*, 915 F.2d 584 (10th Cir. 1990), *cert. denied*, 500 U.S. 916 (1991). The intervening period of disposition of coal estates between 1909 and 1920 established that Congress intended to reserve and convey an entire coal estate, including CBM, and all associated development rights. In any event, CBM development rights fall reasonably within the scope of "coal deposit" rights leased under the Mineral Leasing Act, and that act's provisions do not demonstrate that Congress viewed CBM as a non-constituent of coal. Mineral Leasing Act, § 2 ("coal deposits"), § 7 ("the privilege of mining or extracting the coal in the lands . . . ."); 30 C.F.R. § 206.264 (establishing royalty valuation for in situ coal development); *In Situ Gasification of Coal*, No. M-36890, Opinion of Regional Solicitor (May 10, 1977), Gower Federal Service (Min.) SO-1 (1979) (recognizing federal lessee of coal deposits as having exclusive possession of coal beds).

On two subsequent occasions, Congress has limited the federal interest in reserved coal estates when conflict has arisen between the government and agricultural patentees. Act of August 11, 1955, ch. 795, 69 Stat. 679 (codified

as 30 U.S.C. §§ 541-541i) ("1955 Act"); Enzi Act. In both instances, Congress has permitted agricultural patentees to enter into reserved coal beds to extract components of coal; however, in neither instance has Congress permitted such entry to interfere with rights of third parties in reserved coal estates previously secured from the government. 30 U.S.C. § 541c; Enzi Act § 1(b)(3)-(6). In permitting mining of source material from lignites under the 1955 Act, Congress recognized that the coal estate reservations under the 1909 and 1910 Acts barred such development without legislation. 30 U.S.C. § 541c. Similarly, under the Enzi Act, Congress permitted agricultural patentees to continue CBM extraction; however, Congress limited its waiver to only those instances in which CBM wells had already been drilled or authorized by agricultural patentees under pre-existing CBM leases. Enzi Act § 1(a)(1)-(2). Those subsequent legislative actions represent limited exceptions intended to avoid conflict between the federal government and patentees, but do not support a narrow construction of the scope of coal estates under the 1909 and 1910 Acts.

D. Practicalities.

Reading the 1909 and 1910 Acts "in a practical way" and taking account of the "condition of the country" when the Acts were passed compel the conclusion that CBM is part of the reserved coal deposits that belong to the Tribe. As Petitioners note, public land statutes should be interpreted in view of "'the condition of the country when the acts were passed . . . .'" *Leo Sheep*, 440 U.S. at 682 (quoting *Winona & Saint Peter R.R. v. Barney*, 113 U.S. 618, 625 (1885)); Pet. Br. 27. In addition, as Petitioners repeatedly admonish, the subject of mineral ownership should be dealt with in a practical way. *Burke*, 234 U.S. at 679; Pet. Br. 22. The proper application of those standards to this controversy results in the inescapable conclusion that CBM is part of the reserved coal estate.

At the time the Acts authorized division of the coal deposits from the remainder of the land, the overwhelming practical consideration affecting the treatment of CBM concerned the essential need to ventilate CBM in the course of coal mining.[16] *See, e.g.*, M. Duel & A. Kim, *Methane Control Research: Summary of Results, 1964-80*, U.S. Bureau of Mines, Bulletin 687, at 3 (1984). While the owner of the coal estate could not commercially develop the reserved coal without disposing of the CBM, the nonmineral patentee had no interest in CBM found in the coal. In short, the necessity for the coal owner to deal with the CBM in mining the reserved coal is the dominant practical consideration in construing the Acts in light of the condition of the country at the time of their enactment.

Petitioners strain to sever ownership of CBM from the solid parts of unmined coal and to create a substitute and artificial link between CBM and the natural gas found outside the coal beds. That approach is premised on false legalities rather than practicalities, and ignores the overriding need at the time the Acts were passed for the coal owner to control the CBM in the course of mining the reserved coal deposits. Moreover, Petitioners' concerns relate to the situation today and do not bear on Congress' intent when it passed the Acts. As is clear from the circumstances surrounding the Section 29 tax credits, the problems Petitioners seek to portray with regard to a "split" gas estate are easily resolved under today's technology. There simply is no practical problem in distinguishing coalbed methane from other gases. Petitioners

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16 Federal law requires that coal mine operators ventilate mines to "carry away methane . . . ." 30 U.S.C. § 863(b), and to formulate and implement "methane . . . control plans . . . ." 30 U.S.C. § 863(o); 30 C.F.R. § 75.370. Coal mine operators are also required to drill "boreholes" into coal in advance of the working mine face. 30 C.F.R. § 75.388.

themselves have done so in order to collect tax credits and could do so for other purposes as well.

Petitioners also argue that their approach is rendered practical by the "accommodation doctrine" of state mineral law. But the accommodation doctrine does not establish title; it permits the owner of one estate to use another's property only when the absence of such use would deprive the owner of his estate. Here, there is no dispute that the Petitioners may drill through the Tribe's coal to obtain gas to which they are entitled from different formations. As the Tenth Circuit found, however, Petitioners may not stretch the accommodation doctrine into a rule that permits them to enter into the Tribe's coal deposits to extract CBM that they neither own nor have any right to develop. *Southern Ute Indian Tribe v. Amoco Prod. Co.*, 151 F.3d 1251, 1261-63 (10th Cir. 1998) (citing *United States Steel Corp. v. Hoge*, 468 A.2d 1380 (Pa. 1983); *Vines v. McKenzie Methane Corp.*, 619 So.2d 1305 (Ala. 1993) (other citations omitted)) (Cert. Pet. App. 21a-24a).

III. THE CANON OF CONSTRUCTION THAT AMBIGUITIES IN LAND GRANTS BE RESOLVED IN FAVOR OF THE SOVEREIGN SUPPORTS THE CONCLUSION THAT CBM WAS INCLUDED IN THE RESERVED COAL ESTATES.

A. Ambiguous Language in Federal Land Grant Statutes Is Interpreted in Favor of the Federal Objectives Underlying the Legislation.

In construing the public land laws, the long-standing rule is that statutes granting rights from the federal government "must be construed favorably to the government and that nothing passes but what is conveyed in clear and explicit language—inferences being resolved not against but for the government." *Caldwell v. United States*, 250 U.S. 14, 20 (1919) (citations omitted). Stated another way, "if rights claimed under the government be set up

against it, they must be so clearly defined that there can be no question of the purpose of congress to confer them." *Sioux City & St. P. R. Co. v. United States*, 159 U.S. 349, 360 (1895) (citations omitted). Moreover, silence in the language of such grants should not be read so as to depart from prevailing policies or practices, even if the general terms of the legislation could be so construed. *United States v. Sweet*, 245 U.S. 563, 572 (1918); *see generally Andrus v. Charlestone Stone Prods. Co.*, 436 U.S. 604, 617 (1978) (support for refusing to treat water as "valuable mineral" under federal mining laws); *Caldwell*, 250 U.S. at 20 (support for holding that railroad companies having right to take timber for railroad construction do not have right to sell tops of trees cut for railroad ties); *Northern Pac. Ry. v. Soderberg*, 188 U.S. 526, 534 (1903) (lands valuable as granite quarry were mineral lands excepted from railroad grant).

To be sure, the canon must be applied with care. It should not be invoked to construe in a miserly manner legislative grants designed to induce the construction of facilities such as railroads or the completion of other tasks intended to benefit the nation. The grants found in such legislation "stand[] upon a somewhat different footing from merely a private grant, and should receive at the hands of the court a more liberal construction in favor of the purposes for which it was enacted." *United States v. Denver & Rio Grande Ry.*, 150 U.S. 1, 14 (1893) (citation omitted), *quoted in Leo Sheep*, 440 U.S. at 682. Likewise, the rule does not apply in situations in which a restrictive reading of federal legislation would deny bona fide settlers all title to the public land on which they settled. *Great Northern Ry. v. Reed*, 270 U.S. 539, 546 (1926); *Ard v. Brandon*, 156 U.S. 537, 543 (1895).

B. Application of the Canon Here Compels the Conclusion That the Owner of the Coal Deposits Owns the CBM.

To the extent that the Acts are deemed ambiguous, the canon of construction that "nothing passes except what is conveyed in clear language, and that if there are doubts they are resolved for the Government, not against it" squarely applies. *United States v. Union Pac. R.R.*, 353 U.S. 112, 115 (1957) (citations omitted). Application of the canon to the Acts requires that the CBM remain legally in the same place as it is found physically—as part of the Tribe's coal deposits reserved for future disposition by the United States. Ambiguity in the Acts, if any, results from legislative imprecision in describing the boundary between the limited, nonmineral patentee's estate and the coal deposits reserved for disposition under the coal lands laws. To avoid an absurd result, the canon requires examination of the federal purposes underlying the Acts, as well as the context in which Congress passed the Acts. The 1909 and 1910 Acts had two purposes: to permit agricultural entry onto valuable coal lands otherwise unavailable for such entry; and to protect the federal interests in reserved coal deposits later to be conveyed to coal estate grantees. Both objectives must be examined to determine which interpretation of the Acts in this case advances those legislative goals.

Petitioner would define CBM as a non-constituent of coal and would separate the right to extract CBM from the right to develop the solid fuel components of coal. As proven by the notices of election that Petitioners' predecessors signed, no commercial rights associated with coal were claimed or needed in establishing a homestead. Nor is Petitioners' ownership of CBM now required to remain true to the principle that unreserved valuable resources discovered after patent issuance passed to the agricultural patentee. In sum, the retention of CBM as part of the reserved coal deposits does not interfere with the ex-

pressed federal purpose of permitting agricultural entry onto known coal lands, and it treats the nonmineral patentees in an equitable fashion.

On the other hand, reading the Acts to grant ownership of the CBM to those nonmineral patentees runs directly counter to the Acts' purpose of fostering future coal development under the federal coal lands laws. The Acts were not intended to permit the entryman "to acquire any right whatever in the coal under the surface of the ground he settles upon . . . ." 45 CONG. REC. 6154 (1910) (statement of Rep. Butler). Nor does the language of the Acts suggest that the recipients of the coal deposits would receive something less than the complete coal estates sold under the Coal Lands Sales Act of 1873. Yet by Petitioners' strained reading the nonmineral patentee would control the CBM that must be ventilated for the reserved coal to be mined. In order to fulfill the Acts' purpose of maintaining the coal for development under the coal land laws, the party who in the future acquired the right to develop the coal deposits needed the concurrent right to control the associated CBM in order to mine the coal. Nothing in the language of the Acts or their history suggests that Congress intended that the owner of the coal estate would have to negotiate with the nonmineral patentee for that right, which was absolutely necessary for the development of the coal. Such an absurd—and impractical—construction is not implied, let alone compelled by the language of the Acts.

CONCLUSION

The judgment of the court of appeals should be affirmed.

Respectfully submitted,

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Dated: April 2, 1999

Supreme Court, U.S.
FILED
APR 2 1999
CLERK

No. 98-830

In the Supreme Court of the United States

OCTOBER TERM, 1998

AMOCO PRODUCTION COMPANY, ET AL., PETITIONER

v.

SOUTHERN UTE INDIAN TRIBE, ET AL.

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE TENTH CIRCUIT

BRIEF FOR THE FEDERAL RESPONDENTS

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QUESTION PRESENTED

Whether Congress's reservation of "coal" in the Coal Lands Act of 1909, ch. 270, 35 Stat. 844, and the Coal Lands Act of 1910, ch. 318, 36 Stat. 583, includes coal bed methane.

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In the Supreme Court of the United States

OCTOBER TERM, 1998

No. 98-830

AMOCO PRODUCTION COMPANY, ET AL., PETITIONER

v.

SOUTHERN UTE INDIAN TRIBE, ET AL.

ON WRIT OF CERTIORARI
TO THE UNITED STATES COURT OF APPEALS
FOR THE TENTH CIRCUIT

BRIEF FOR THE FEDERAL RESPONDENTS

OPINIONS BELOW

The opinion of the en banc court of appeals (Pet. App. 1a-51a) is reported at 151 F.3d 1251. The panel decision of the court of appeals (Pet. App. 52a-94a) is reported at 119 F.3d 816. The opinion of the district court (Pet. App. 95a-132a) is reported at 874 F. Supp. 1142.

JURISDICTION

The court of appeals, sitting en banc, entered its decision on July 20, 1998. On October 15, 1998, the Chief Justice extended the time for filing a petition for a writ of certiorari to November 18, 1998, and the petition was filed on that date. The jurisdiction of this Court is invoked under 28 U.S.C. 1254(1).

STATEMENT

At the beginning of the twentieth century, President Theodore Roosevelt and Congress took action to maintain the Nation's coal resources in public ownership to meet the Nation's vital energy needs. This case presents the question whether, when Congress reserved "all coal" in the Coal Lands Act of 1909, ch. 270, 35 Stat. 844, and "all the coal" in the Coal Lands Act of 1910, ch. 318, § 3, 36 Stat. 584, Congress retained all of the hydrocarbon compounds present in coal, including a component commonly known as coal bed methane (CBM). The United States Court of Appeals for the Tenth Circuit, sitting en banc, determined that Congress retained the CBM as part of the reserved coal and that the Southern Ute Indian Tribe, which now owns some of that reserved coal, therefore also owns the CBM component. Petitioners Amoco Production Company et al., challenge that ruling. Petitioners contend that Congress reserved only those components that they describe as "solid coal." To place this controversy in context, we first describe the nature of the physical resource at issue and the statutory bases for the competing ownership claims. We then turn to the origins and posture of the current controversy.

A. The Physical Resource

Petitioners and the Tribe make competing claims to the ownership of CBM that rest, in significant part, on their different characterizations of that energy resource. The Tribe, which indisputably owns the coal underlying its Reservation, contends that CBM is a constituent of coal. Petitioners, who claim a right to drill for natural gas within the Reservation, contend that CBM is simply natural gas that happens to be found in coal deposits. The United States had originally agreed with petitioners' characterization, but, as a result of further analysis precipitated by the court of appeals' decisions, the United States has concluded that

petitioners' position is wrong. To shed light on the competing characterizations, we begin by providing a brief introduction to the undisputed scientific facts respecting coal and CBM.

1. Coal is essentially fossilized plant material that has undergone a physical and chemical transformation, over millions of years, through the process of accumulation, biological decomposition, and metamorphosis under conditions of high pressure and temperature. See, *e.g.*, Van Krevelen, *Coal* 2-3 (1993) (Van Krevelen); Ward, *Coal Geology*, *in* 3 *Encyclopedia of Physical Science & Technology* 371-372 (2d ed. 1992). Coal is a heterogeneous substance that invariably contains carbonaceous material, moisture, and small amounts of minerals. *Id.* at 372. Because the conditions for coal formation vary, the composition and characteristics of individual coal deposits are not uniform. *Ibid.* For practical purposes, coal users customarily classify coal, based on the ascending degree to which "coalification" has taken place, as lignitic, sub-bituminous, bituminous, and anthracitic. See *id.* at 377, Table I (Coal Classification by the American Society for Testing and Materials (ASTM)). See generally Myers, *Coal Handbook* (1981) (J.A. 543-552); Bend, *The Origin, Formation, and Petrographic Composition of Coal*, 71 J. of Fuel 851-862 (1991) (Bend) (C.A. App. 664-675); Aff. of Dr. Harry Marsh, JA 378-379; Aff. of Jeffrey R. Levine, JA 347-348.

Bituminous and anthracitic coals generally have the appearance of a black rock. Their actual structure, however, is quite complex. See Larson & Gorbaty, *Coal Structure and Reactivity*, *in* 3 *Encyclopedia of Physical Science and Technology* 437, 441 (2d ed. 1992) (Larson & Gorbaty). At the macroscopic level, coal typically exhibits stratified layers that are themselves composed of microscopic organic composites, called macerals, interspersed with mineral matter. *Id.* at 439-440, 443. The composition of the macerals depends

in part on the composition of the fossilized organic material (*e.g.*, lignins, waxes, or carbonized wood). *Id.* at 439-440. See generally Bend, C.A. App. 675-680; Marsh Aff., JA 374-376; Aff. of Stephen L. Bend, JA 302 & Table A.

2. The dispute in this case arises from the unusual physical characteristics of coal. Coal is extremely porous, containing as much as 20% void volume, and yet is relatively impermeable to passage of gases and liquids. See Larson & Gorbaty 442-443. The carbonaceous materials within the macerals of bituminous and anthracitic coals typically are "penetrated by an extensive network of very tiny pores and, because of this, have enormous surface areas." *Id.* at 442-443. At the same time, the small size of the pores restricts the passage of molecules through the coalbed. "The smaller pores are about the same size as small molecules, so coals are molecular sieves, capable of trapping small molecules in their pores while denying access to larger molecules." *Id.* at 443. See also, *e.g.*, Van Krevelen 207-211.[1]

At this molecular level, coal is not a typical crystalline solid. "Coals are believed to be three-dimensionally cross-linked macromolecular networks containing dissolved organic material that can be removed by extraction." Larson

[1] Coal's pore structure differs in important respects from that found in conventional "reservoir" rocks that contain hydrocarbon gas and liquids. In the case of coal, the pore structure originated from the same organic material that comprises the contained hydrocarbons; the pore structure is itself composed of hydrocarbons; and the pores are orders of magnitude smaller than those found in conventional reservoir rocks, which hold hydrocarbons that migrated from elsewhere. See Levine, *Coal Composition, as Related to the Mode of Occurrence of "Coalbed Methane"* (1992) (JA 608-611). "To provide a concept of scale: A single methane molecule residing in a 1 millimeter-diameter pore [typical of conventional reservoir rock] has the same 'aspect ratio' as a pin *point* (not a pin head) in a football field; whereas the microporosity in coal is barely larger than the sorbate molecules that reside within it." JA 610.

& Gorbaty 444. "The extractable portion of the coal is simply dissolved in this solid, insoluble framework." *Id.* at 445. "As much as 25% of many coals consists of small molecules that will dissolve in a favorable solvent and can thereby be removed from the insoluble portion." *Id.* at 444. See also Van Krevelen 598 ("the principle component of [bituminous] coals consists of a porous cross-linked macromolecular network in which a complex mixture of soluble molecules is intimately sorbed"); see generally Levine Aff., JA 342-353; Levine, *Coal Composition, as Related to the Mode of Occurrence of "Coalbed Methane"* (1992) (Levine Rep.) (JA 580-593).

For this reason, scientists describe coal as having a "colloidal" structure[2] consisting of a rigid macromolecular "matrix" component and a dispersed "molecular" or "mobile" component. See, *e.g.*, Van Krevelen 193, 598; see also Levine Rep., JA 584-593; Bend Aff., JA 305-308; Marsh Aff., JA 381-386. Each of those components plays a role in determining a particular coal's characteristics, Van Krevelen 598, and neither phase is entirely static or homogeneous, Levine Rep., JA 588. The coalification process, which gradually transforms lower rank coals to higher ranks, continuously alters the composition and characteristics of each component. See, *e.g.*, Levine Rep., JA 605-608; Levine Aff., JA 347-348. Throughout that gradual process, coal remains a complex mixture consisting of an extended macromolecular

[2] Colloids are "systems" made up of a combination of liquids, gases, or solids in which one phase is dispersed in another. See, *e.g.*, 1 *Van Nostrand's Scientific Encyclopedia* 697-700 (7th ed. 1988). For example, milk is a colloid consisting of a solid dispersed in a liquid, vinaigrette is a colloid consisting of a one liquid dispersed in another insoluble liquid, and jam is a colloid consisting of a liquid dispersed in a solid. See *ibid.* Viewed from this perspective, coal is a "solid colloid" consisting of gaseous and liquid hydrocarbons dispersed within the solid macromolecular matrix. See Van Krevelen 193, 598.

matrix held together by stronger, covalent bonds, and a mobile phase, consisting of a mixture of smaller molecules that are held within that macromolecular framework through physical constrictions, hydrogen bonding, and Van der Waals forces. See Levine Rep., JA 586-587; Bend Aff., JA 308; Marsh Aff., JA 381-387 (explaining covalent bonds and van der Waals forces).

3. The smallest of the organic molecules present in the mobile phase is methane (CH_4). When present in coal beds, the methane (together with small amounts of other coexisting gases) is commonly denominated as coal bed methane (CBM). See, *e.g.*, Levine Rep., JA 594. Like the other organic materials present in coal beds, CBM is a product of the coalification process. *Id.* at 605-608. At standard temperature and pressure, CBM exists as a gas. *Id.* at 595. But when formed in a coal seam, CBM is adsorbed within the pore structure created by the macromolecular matrix and exhibits a density similar to that of liquid methane. Marsh Aff., JA 393; see Levine Rep., JA 610.[3]

More so than larger organic molecules dispersed within the macromolecular matrix, CBM can migrate over time, particularly if the coal seam is fractured or if it is subject to changes in temperature and pressure. Those changes alter the equilibrium within the coal bed, counteract the electrostatic forces that fix the CBM in the adsorbed state, and convert the CBM to free gas that can migrate through the

[3] Petitioners assert that CBM "is simply natural gas." Pet. Br. 12. But as petitioners acknowledge, the term "natural gas" is generally used to describe "the gaseous phase of petroleum." Hunt, *Petroleum Geochemistry and Geology* 185 (2d ed. 1996). See Pet. Br. 8. Petitioners are correct that CBM and natural gas both consist of a mixture consisting primarily of methane. *Id.* at 9, 12. But we apply the term CBM specifically to the methane-rich mixture that is produced through the coalification process and that remains within the coal bed. That is the only substance at issue here. See Pet. App. 18a note 8.

pores and out of the coal's macromolecular matrix. See Levine Rep., 595-596. Energy companies have developed technology to produce CBM from coal beds through fracturing and creation of pressure or temperature gradients. *Ibid.*; Marsh Aff., JA 395; Levine Aff., JA 351-352. The current controversy centers on whether CBM produced in this manner should be treated, for purposes of the Coal Lands Act of 1909 and the Coal Lands Act of 1910, as part of the coal or as a separate mineral estate.

B. The Statutory Basis For The Competing Ownership Claims

The competing claims to ownership of CBM arise from two congressional enactments in the early twentieth century, the Coal Lands Act of 1909, ch. 270, 35 Stat. 844, and the Coal Lands Act of 1910, ch. 318, 36 Stat. 583. Congress enacted those statutes to allow homesteaders to obtain patents to public lands that the United States believed to be valuable for coal, while reserving the coal itself in federal ownership. The genesis of those statutes is described in *Watt* v. *Western Nuclear, Inc.*, 462 U.S. 36, 47-49 (1983), as well as other sources. See, *e.g.*, Swenson, *Legal Aspects of Mineral Resources Exploitation* (Swenson), *in* Gates, *History of Public Land Law Development* 699, 724-730 (1978) (Gates).

1. During the latter half of the nineteenth century, Congress made unappropriated public lands available for settlement through the Homestead Acts, see, *e.g.*, Act of May 20, 1862, ch. 75, 12 Stat. 392, and the Desert Land Acts, see, *e.g.*, Act of Mar. 3, 1877, ch. 107, 19 Stat. 377 (43 U.S.C. 321-323), which enabled settlers to obtain a land patent by entering and cultivating tracts of prescribed size for a period of years. See Gates 387-434. Congress exempted from entry under those Acts, however, public land classified as valuable for coal. *Western Nuclear*, 462 U.S. at 47- 48. Coal lands instead

could be purchased under the Coal Lands Act of 1864, ch. 205, 13 Stat. 343, and the Coal Lands Act of 1873, ch. 279, 17 Stat. 607 (see 30 U.S.C. 71 *et seq.*). See generally Swenson 724-725.

The process of segregating agricultural lands from coal lands proved unsuccessful because coal lands were frequently misclassified as a result of mistake or outright fraud. *Western Nuclear*, 462 U.S. at 48 note 9. In 1906, President Theodore Roosevelt withdrew from all forms of entry approximately 64 million acres of lands thought to contain coal, "citing the prevalence of land fraud and the need to dispose of coal 'under conditions which would inure to the benefit of the public as a whole.'" *Id.* at 48-49 (quoting 41 Cong. Rec. 2615 (1907)). President Roosevelt later "urged Congress that 'rights to the surface of the public land . . . be separated from rights to forests upon it and to minerals beneath it, and these should be subject to separate disposal.'" *Id.* at 49. By enacting the Coal Lands Act of 1909 and the Coal Lands Act of 1910, Congress took the first in a series of steps to effectuate that separation, which has resulted in preserving the public's ownership of a significant share of the Nation's energy resources. *Id.* at 49 & note 10; see Swenson 725-729.

The 1909 Act answered the concerns of individuals who had in good faith made agricultural entries onto tracts subsequently identified as coal lands. The Act permitted the entryman to receive a patent to his tract, but required the patent to contain a reservation to the United States "of all coal in said lands, and the right to prospect for, mine, and remove the same." 35 Stat. 844 (currently codified at 30 U.S.C. 81). The 1910 Act opened the remaining coal lands for entry under the homestead laws, allowing "actual settlers," upon proof of compliance with the homestead laws, to receive patents to the surface of those lands. § 1, 36 Stat. 583. As in the case of the 1909 Act, the patents contained a

reservation to the United States "of all the coal in the lands so patented, together with the right to prospect for, mine, and remove the same." § 3, 36 Stat. 584 (currently codified at 30 U.S.C. 83-85).

The Coal Lands Acts reserved to the United States *all* coal in the lands, including "coal that is of but little present commercial value," and confined the entries allowed on coal lands to "settlement and development entries in order that none of the so-called speculative entries may be made on the surface of coal land." 45 Cong. Rec. 6042 (1910) (Rep. Mondell). The purpose of the statutes was "the separation of the surface title, which is fitted for agriculture, from the coal measures lying beneath the surface." 45 Cong. Rec. 7453 (1910) (Sen. Dixon).[4]

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[4] Congress also took other steps during the same era to preserve public ownership of mineral resources. In 1910, Congress enacted the Pickett Act, which affirmed the President's authority to withdraw public lands for waterpower sites, irrigation, classification of lands, or other public purposes. Act of June 25, 1910, ch. 421, 36 Stat. 847. During the early part of this century, the President exercised Pickett Act authority as well as inherent withdrawal authority in the interest of natural resource conservation. See *United States* v. *Midwest Oil Co.*, 236 U.S. 459 (1915). And in the years following enactment of the Coal Lands Acts, Congress enacted a series of additional statutes to reserve other nonmetaliferous minerals.

In 1912, Congress enacted a statute allowing agricultural entry on lands withdrawn or classified as valuable for petroleum in the State of Utah, reserving "the oil and gas in such lands" and "the right to prospect for, mine, and remove the same." Act of Aug. 24, 1912, ch. 367, § 1, 37 Stat. 496. In 1914, Congress enacted the Agricultural Entry Act, which generally allowed agricultural entry of lands identified as valuable for phosphate, nitrate, potash, oil, gas, or asphaltic minerals, subject to a reservation of "the deposits on account of which the lands were withdrawn or classified or reported as valuable." Ch. 142, § 1, 38 Stat. 509 (currently codified at 30 U.S.C. 121-123). And in 1916, Congress enacted the Stock-Raising Homestead Act, ch. 9, 39 Stat. 862 (currently codified as 43 U.S.C. 291 *et seq.*), which authorized the issuance of patents subject to a

2. The lands opened for settlement under the Coal Lands Acts of 1909 and 1910 included lands within the Southern Ute Indian Reservation in Colorado. In 1880, the members of the Southern Ute Indian Tribe agreed to sell a large portion of their land within the Reservation to the United States, excepting certain allotted lands "provided for their settlement." Act of June 15, 1880, ch. 223, 21 Stat. 200. Congress directed that the ceded, unallotted reservation lands be treated as public lands, and it opened those lands to entry for non-Indian settlement under the homestead laws. See § 3, 21 Stat. 203. See generally *United States* v. *Southern Ute Tribe*, 402 U.S. 159, 162-164 (1971). The ceded territory included lands that President Roosevelt later withdrew from entry and that Congress made available for surface patenting under the 1909 and 1910 Acts.

In 1938, under the authority of the Indian Reorganization Act of 1934, ch. 576, 48 Stat. 984 (25 U.S.C. 461-479), the United States restored to the Tribe, in trust, title to the ceded reservation lands that had not been disposed of, including the reserved coal. Pet. App. 109a. As a result of that restoration, the Tribe now has equitable title to tribal lands within its Reservation and the coal estate beneath lands within the Reservation that were settled by non-Indians under the 1909 and 1910 Acts. Petitioners, by contrast, own the non-coal portions of the lands conveyed under the 1909 and 1910 Acts or, alternatively, hold mineral leases from those owners, limited to non-coal resources of those lands. *Id.* at 109a-110a.

C. The Current Controversy

The energy shortages of the 1970s prompted investigation into alternative fuel sources, including the possibility of

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reservation of "the coal and other minerals in the lands," § 9, 39 Stat. 864. See *Western Nuclear*, *supra*.

extracting CBM from coal. Questions arose, however, over who owned the CBM if the owner of the fee had severed, by sale or reservation, a coal estate or a gas estate from the remainder of the fee. That issue could arise under federal law, by virtue of the 1909 and 1910 Acts as well as under the Agricultural Entry Act of 1914, 30 U.S.C. 121-123, which reserved "gas" to the United States. Related questions about the status of CBM could also arise under the Mineral Leasing Act of 1920, 30 U.S.C. 181 *et seq.*, which provides for leasing of both coal and gas. CBM ownership issues could also arise under state law by virtue of an individual owner's decision to lease or reserve coal or gas. See, *e.g.*, Farnell, *Methane Gas Ownership: A Proposed Solution for Alabama*, 33 Ala. L. Rev. 521 (1982).[5]

1. In 1981, the Solicitor of the Interior issued an opinion entitled *Ownership of and Right to Extract Coalbed Gas in Federal Coal Deposits*, 88 Interior Dec. 538 (Pet. App. 140a-159a). The Solicitor determined that he should address the issue because "the unresolved legal status of coalbed gas on federal lands and in federal coal has hindered any decision on how, and under what right of extraction, it can be developed." Pet. App. 142a. The Solicitor concluded that: (1) the 1909 and 1910 Acts did not reserve the coal bed gas found in the reserved coal; (2) the reservation of gas under the Agricultural Entry Act included coal bed gas; and (3) coal bed gas is disposable under the oil and gas leasing provisions of the Mineral Leasing Act. See *id.* at 143a. The Solicitor

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[5] See also, *e.g.*, Bowles, *Coalbed Gas: Present Status of Ownership Issue and Other Legal Considerations*, 1 E. Min. L. Inst. 7-1 (1980); Craig & Myers, *Ownership of Methane Gas in Coalbeds*, 24 Rocky Mtn. Min. L. Inst. 767 (1978); McGinley, *Legal Problems Relating to Ownership of Gas Found in Coal Deposits*, 80 W. Va. L. Rev. 369 (1978); Olson, *Coalbed Methane: Legal Considerations Affecting Its Development As An Energy Resource*, 13 Tulsa L.J. 377 (1978).

cautioned, however, that "nothing in this opinion warrants title to any oil and gas deposit." *Id.* at 159a.

2. Ten years later, on December 31, 1991, the Tribe filed this action against petitioners and others who asserted a right to recover CBM from the Tribe's coal deposits in lands patented pursuant to the 1909 and 1910 Coal Lands Acts. The Tribe sought a declaration that it is the sole owner of the CBM that resides within the coal seam, and it sought damages for the alleged trespass and conversion of the Tribe's property. The Tribe also sued the United States, seeking a declaration that the United States owed a duty to the Tribe to protect and manage CBM development for the Tribe. See JA 171-179.[6]

Petitioners responded that the reservation of "all coal" in the 1909 and 1910 Acts did not include CBM, and they also raised other affirmative defenses. The United States concurred in petitioners' interpretation of the two Acts, relying on the 1981 Solicitor's opinion, and additionally asserted that the Tribe's breach of trust claim against the United States was barred by the applicable six-year statute of limitations, 28 U.S.C. 2401(a), in light of Tribe's past history of CBM development and its knowledge of the Solicitor's 1981 opinion.

3. The district court ruled on cross-motions for summary judgment that "Congress did not reserve CBM gas in the United States in the Coal Lands Acts of 1909 and 1910 and, consequently, [the Tribe's] claim of equitable ownership of CBM gas in the lands at issue fails." Pet. App. 98a. The court concluded, on the basis of dictionary definitions that

[6] The Tribe additionally filed suit against the United States in what is now the United States Court of Federal Claims, alleging that the United States had breached its trust obligation to protect the Tribe's interest in property with respect to development of the CBM. See U.S. C.A. Br. 26 note 7.

describe coal as a "solid" or "rock," that the 1909 and 1910 Acts do not include CBM. *Id.* at 110a-116a. The court also concluded that the legislative history of those Acts, which made no reference to CBM, supported that interpretation. *Id.* at 116a-127a.[7]

4. The court of appeals reversed the district court's judgment and remanded for further proceedings. Pet. App. 52a-94a. The court of appeals reasoned that the question of CBM ownership "cannot be disposed of by the simple tautology that gas is gas," *id.* at 63a-64a, because Congress could have reasonably viewed adsorbed CBM as "an integral part of the coal," *id.* at 64a. The court concluded that the 1909 and 1910 Acts manifested no specific intent to convey CBM, *id.* at 66a, and that those Acts manifested a general intent to reserve the federal government's entire economic interest in the coal deposits, *id.* at 71a-72a. Those considerations, "coupled with the principle of statutory construction that resolves ambiguity in favor of the sovereign," see, *e.g.*, *Western Nuclear*, 462 U.S. at 59, persuaded the court that "CBM was reserved to the United States." Pet. App. 72a.

5. Petitioners sought rehearing en banc, and the en banc court granted rehearing limited to the question "whether 'coal' as used in the Coal Lands Act of 1909 and 1910 unambiguously excludes or includes CBM." Pet. App. 8a. By a vote of six to three, the en banc court adhered to, and supplemented, the reasoning of the unanimous panel. *Id.* at 1a-51a; see *id.* at 8a-9a. The en banc court held that the term

[7] The district court did not address affirmative defenses, including the United States' assertion that the action against the United States was barred by the applicable statute of limitations. See Pet. App. 130a-131a. The district court correctly rejected the Tribe's invocation of the principle that doubts regarding the interpretation of statutes be resolved in favor of the Indians in this case. As the district court pointed out, the Acts are public land laws, not statutes passed for the special benefit of Indians. *Id.* at 127a.

"'coal' as used in the Coal Lands Acts of 1909 and 1910 neither unambiguously includes or excludes coal bed methane. Given the established principle that all doubts respecting land grants and mineral reservations are construed in favor of the government, *see Watt v. Western Nuclear, Inc.*, 462 U.S. at 59," the en banc court concluded that "coal reserved to the United States in the 1909 and 1910 Acts includes the adsorbed CBM." Pet. App. at 32a-33a. In reaching the conclusion that the 1909 and 1910 Acts are ambiguous, the en banc court surveyed the language of those Acts, *id.* at 11a-14a, contextual indicia of Congress's specific intent, *id.* at 14a-24a, and indicia of Congress's general intent drawn from the legislative history and related statutes, *id.* at 24a-32a. Three judges dissented, reasoning that "coal was not understood, either in 1909 or today, to include a gas." *Id.* at 34a; see *id.* at 34a-51a.[8]

SUMMARY OF ARGUMENT

The Tenth Circuit, sitting en banc, correctly concluded that Congress's reservation of "all coal" in the Coal Lands Acts of 1909 and "all the coal" in the Coal Lands Act of 1910 includes coal bed methane (CBM). In accordance with this Court's guidance, the court carefully evaluated the language of those statutes, the specific context in which the language was used, and the broader context of the Acts as a whole.

[8] The United States did not petition for rehearing en banc. After rehearing en banc was granted, the United States filed a supplemental brief explaining that it had previously endorsed petitioners' arguments on the basis of the 1981 Solicitor's opinion and not merely on the basis that the question of CBM ownership should be resolved by reference to the dictionary meaning of the term "coal." See Pet. App. 9a note 2. The United States additionally explained that, in light of the panel's decision, the Solicitor of the Interior had commenced a review of the analysis set out in the 1981 Solicitor's opinion and that the review could conceivably result in modification of the views expressed therein. *Ibid.*

See *Robinson* v. *Shell Oil Co.*, 519 U.S. 337, 341 (1997). The court of appeals determined that Congress did not express any intent, whether by clear language or by necessary or fair implication, to convey away the public's ownership of CBM, which is one of the natural constituents of coal. Petitioners' contrary contention, which ultimately rests on the mantra that "coal" means "*solid* coal" (Pet. Br. 20), does not withstand careful scrutiny.

A. Congress's use of the term "coal," taken in its ordinary sense at the time the Coal Lands Acts were enacted, referred to the carbonaceous substance that nature deposited in the form of coal seams and that miners removed as a source of fuel. That substance always contains, as an essential constituent, CBM. The scientific literature confirms what Congress and the general public knew as a matter of practical experience and common sense: coal has aggregate characteristics of a solid, but it consists of a mixture of solid, liquid, and gaseous constituents, including CBM. It would not only be completely unnatural to construe the term "coal" as limited to "solid coal," but it also would raise a host of practical problems and definitional inconsistencies. For example, coal contains both moisture and liquid coal extracts, which are undeniably constituents of coal. Yet, under petitioners' novel definition, Congress did not include those constituents within the coal reservation because they are not "solid coal."

The historical context also supports the court of appeals' judgment. Congress had no reason to separate from the coal, as a matter of law, a constituent that could not be readily separated as a matter of practical fact. Indeed, an important coal technology of that era—the gas producer—actually utilized the CBM. The legislative history contains no discussion of CBM, and the most reasonable inference from the floor colloquies is that Congress viewed CBM as a component of coal and not as "natural gas." The court of appeals'

judgment also finds support in the way that contemporary state law treated both fixed minerals and gas. See, *e.g.*, *Kansas Natural Gas Co.* v. *Board of County Comm'rs*, 89 P. 750, 752 (Kan. 1907) ("until gas is actually produced and severed so that it becomes personalty the legal title to, and possession of, the entire volume remain in the owner of the strata in which it is confined"). It therefore comes as no surprise that the majority of state courts that have confronted the practical realities of CBM production have rejected petitioners' position that a coal estate does not include CBM.

B. The en banc court properly rejected petitioners' assertion that their proposed construction of the term "coal" is so plainly correct as to be "clear as day." Pet. Br. 43. Having carefully applied this Court's guidance on statutory construction, and finding no basis for inferring that Congress intended to convey a constituent of coal to homesteaders, the court of appeals properly invoked the "established rule" that doubts respecting Congress's intent should be resolved in favor of retaining public ownership. See, *e.g.*, *Watt* v. *Western Nuclear, Inc.*, 462 U.S. 36, 59 (1983). Petitioners do not contest the validity of that principle; they argue only that it should not be applied here. But that contention is not substantial in light of the absence of any clear expression of congressional intent to convey the CBM component of coal deposits. Indeed, application of the canon of construction here furthers its fundamental purpose, by reserving to Congress the power and responsibility to weigh the competing policy considerations bearing on whether to dispose of that property of the United States.

C. At the commencement of this litigation, the United States had supported petitioners' position, based on the reasoning contained in the 1981 opinion of the Solicitor of the Interior. This litigation—the first instance in which that opinion has been subject to the adversarial process—has

revealed that the Solicitor's 1981 decision is mistaken. The Solicitor has therefore withdrawn that opinion. Contrary to petitioners' assertions, there is nothing improper in the Solicitor's reexamination of an opinion in light of the insights gained in the course of attempting to defend it in litigation. To the contrary, it is entirely appropriate for the United States to decline to defend a legal position before this Court when an en banc court of appeals has rejected it and the government has concluded that the position is wrong.

ARGUMENT

THE COURT OF APPEALS CORRECTLY RULED THAT THE COAL LANDS ACTS OF 1909 AND 1910 DO NOT GRANT THE PATENT HOLDER A RIGHT TO EXTRACT COAL BED METHANE FROM THE RESERVED COAL

Introduction

Petitioners and the Southern Ute Indian Tribe each claim a right to the coal bed methane found in the coal deposits that Congress reserved through the Coal Lands Acts of 1909 and 1910 and later conveyed to the Tribe. The issue, simply put, is whether CBM is a part of the coal reservation. Petitioners argue that the Congress did not intend to reserve CBM, reasoning that CBM is merely unreserved natural gas that happens to be found in coal seams and that passed into the hands of homesteaders who acquired the coal-bearing lands subject to the federal government's reservation of the coal deposits. The Tribe argues that Congress did intend to reserve CBM, reasoning that CBM is a constituent of the reserved coal that the Tribe acquired from the federal government.

The en banc court of appeals properly framed the issue as one of construing the Coal Lands Acts. Pet. App. 10a. Finding that "[t]he Acts neither define coal nor mention CBM,"

the court of appeals evaluated the issue of CBM ownership based on "traditional tools of statutory construction." *Id.* at 14a. The court first examined the relevant statutory language in light of its specific context, taking into account the historical definitions of "coal" (*id.* at 14a-17a), the then-current knowledge of coal's characteristics (*id.* at 17a-21a), and the state courts' treatment of CBM ownership (*id.* at 21a-24a). The court of appeals then evaluated the statutory language based on the general context of the Acts as a whole (*id.* at 24a-27a), taking into account the statutory objectives, the legislative history, and related statutes that could shed light on Congress's intent in enacting the Coal Lands Acts (*id.* at 27a-31a). After considering all of those sources, the court of appeals concluded that the Coal Lands Acts are ambiguous with respect to Congress's intent to grant or convey CBM, and it applied the "'established rule that land grants are construed favorably to the Government, that nothing passes except what is conveyed in clear language, and that if there are doubts they are resolved for the Government, not against it.'" *Watt* v. *Western Nuclear, Inc.*, 462 U.S. 36, 59 (1983) (quoting *United States* v. *Union Pac. R.R.*, 353 U.S. 112, 116 (1957)). See Pet. App. 10a-11a, 24a, 32a-33a.

The court of appeals' decision is thorough, well reasoned, and faithful to this Court's guidance respecting statutory interpretation. Contrary to petitioners' hyperbole, the six-member majority has not "summarily dispensed with an analysis of the statutory language" (Pet. Br. 17), "mis[read] contemporary texts" (*id.* at 21), disregarded "the language and traditional tools of statutory construction" (*id.* at 42), or "refus[ed] to give the term 'coal' its plain meaning" (*ibid.*). To the contrary, the court's analysis, first in the unanimous panel opinion and later in the en banc decision, prompted the government to reexamine the merits of the position that it had put forward below. The court raised formidable

questions about the correctness of the Solicitor's 1981 opinion. After careful consideration of those questions, the government determined that the 1981 opinion was incorrect and should not be defended before this Court.

Petitioners raise a number of new arguments in support of their view that Congress's coal reservation unambiguously excludes CBM, but those arguments are unpersuasive in salvaging what, upon close inspection, has proven to be a mistaken view of the law. We will begin where the court of appeals' decision left off and provide, point-by-point, the counter-arguments that compel us to reject petitioners' contention that the term "coal" unambiguously excludes CBM. We will then explain why the canon of construction that ambiguous federal grants should be construed in favor of the government not only applies, but has special force in this case. Finally, we will respond to petitioners' charge that the Solicitor has acted improperly in withdrawing the 1981 opinion.

A. The 1909 And 1910 Acts Do Not Unambiguously Convey Away Public Ownership Of CBM

"The plainness or ambiguity of statutory language is determined by reference to the language itself, the specific context in which that language is used, and the broader context of the statute as a whole." *Robinson* v. *Shell Oil Co.*, 519 U.S. 337, 341 (1997). No one disputes that the starting point is the language, Pet. App. 11a, that legislative intent normally "is expressed by the ordinary meaning of the words used," *United States* v. *Locke*, 471 U.S. 84, 95 (1985), or that the statutory language frequently reveals that Congress has dealt with "a practical subject in a practical way," *Burke* v. *Southern Pac. R.R.*, 234 U.S. 669, 679 (1914). See Pet. Br. 21-22. Each of those factors weighs in favor of the court of appeals' judgment and against petitioners' arguments. There is also no dispute that it is appropriate to consider

other portions of the Coal Lands Acts (*id.* at 25-27), and the "historical context" of the Acts (*id.* at 27-41). As the court of appeals concluded, those considerations also weigh against petitioners' construction. See Pet. App. 14a-33a.

1. *The Term "Coal" Has Never Been Understood To Refer Only To What Petitioners Call "Solid Coal."* When Congress reserved "all coal" in the 1909 and 1910 Acts, neither Members of Congress nor the public needed to consult a dictionary to comprehend the basic thrust of the legislation. The Coal Lands Acts reserved in public ownership the familiar carbonaceous substance that miners removed from the ground and the public used for fuel and other purposes. See United States Geological Survey, Dep't of the Interior, *Contributions to Economic Geology 1906* (Pt. 2) (1907) (JA 403-405) (describing the importance of coal to the American economy). Congress and the public knew then, as now, that the substance called coal is not a homogeneous compound, but rather is a complex mixture of organic components. See, *e.g.*, VI *Encyclopaedia Britannica* 575 (11th ed. 1910). It was also common knowledge that coal, both when in the ground and when removed, contains gaseous constituents—including the material, now called CBM, that is at issue in this case. See, *e.g.*, Bureau of Mines, Dep't of the Interior, *The Escape of Gas from Coal* (1911) (JA 510, 521-522). Indeed, it was impossible for miners to remove coal without also removing the inextricably adsorbed CBM, portions of which lingered for months in the mined coal as the gaseous constituents—primarily methane—came into equilibrium with the ambient air. See, *e.g.*, JA 521-522.

It follows that, if the benchmark for determining the scope of Congress's reservation is the ordinary meaning of the term "all coal," then the 1909 and 1910 Acts reserved the entire coal product that miners remove from the coal seam, including the adsorbed hydrocarbon gases that are invariably present both as part of the coal deposit in the ground and

as part of the mined product. As the Kansas Supreme Court rightly observed in 1907, the term "'minerals therein' can mean none other than minerals imbedded in the earth as nature deposited them." *Kansas Natural Gas Co.* v. *Board of County Comm'rs*, 89 P. 750, 751 (Kan. 1907). The same holds true for coal. CBM is "one of the several products of coalification," and so long as it resides in the coal seam, it "cannot logically be considered as being in any way different from other products of coalification." Marsh Aff., JA 398.

The ordinary meaning of "coal" is the practical one as well. If Congress meant to deal with a "practical subject in a practical way," *Burke*, 234 U.S. at 679, it would not have limited its reservation to what petitioners call the *"solid* coal" (*e.g.*, Pet. Br. 20) (emphasis in original) and conveyed to others the inextricably adsorbed component that the miner necessarily removed as part of the mined product. As the court of appeals pointedly stated, "it seems to us quite unlikely that Congress, if it had considered the matter, would have reasoned, 'We want the Government to hold on to the solid bituminous core of these coal deposits, but we make no claim to the thin layer of molecules of CBM which coats the surfaces.'" Pet. App. 19a-20a.

Petitioners urge the opposite conclusion by recourse to current and historic dictionaries and texts that describe "coal" as a "rock" or "solid." Pet. Br. 7-8, 22-25; see, *e.g.*, Van Krevelen, *supra*; II *Century Dictionary & Cyclopedia* 1067 (1906-1909). Petitioners reason that, if coal is a rock or solid, then its reservation cannot include adsorbed CBM, which—when separated from the remainder of the coal—exists as a gas. See Pet. Br. 22-25. As this Court has cautioned, however, "ordinary definitions of the dictionary" may "throw but little light upon" congressional intent in reserving naturally occurring substances. *Western Nuclear*, 462 U.S. at 42-43. Dictionaries can be useful aids in statutory interpretation, but they are no substitute for close analysis of what words

mean as used in a particular statutory context: "it is a 'fundamental principle of statutory construction (and, indeed, of language itself) that the meaning of a word cannot be determined in isolation, but must be drawn from the context in which it is used.'" *Reno* v. *Koray*, 515 U.S. 50, 56 (1995); *Deal* v. *United States*, 508 U.S. 129, 132 (1993). As we explain below, petitioners have selectively read dictionary definitions that are themselves ambiguous on the question presented here. And even if those dictionary definitions were more helpful, petitioners' proposed construction would present a confounding variety of definitional, interpretive, and practical problems.

a. Petitioners' argument is problematic at the outset because current and historical dictionaries that describe coal do not uniformly describe it as a "rock" or "solid." As the court of appeals pointed out, the dictionaries and texts actually describe coal in diverse ways that, taken as a whole, simply highlight that coal is a complex mixture of hydrocarbon compounds. See Pet. App. 16a-17a (citing, for example, VI *The American Cyclopaedia: A Popular Dictionary of General Knowledge* 726 (Ripley & Dana eds. 1873); VI *Encyclopaedia Britannica* 575 (11th ed. 1910); *New Standard Dictionary of the English Language* 508 (1913)). See also Levine Aff., JA 344-345; Marsh Aff., JA 371-381. The variety of prevalent descriptions demonstrates that coal cannot be accurately described through petitioners' selective reliance on one or two words. See *National R.R. Passenger Corp.* v. *Boston & Maine Corp.*, 503 U.S. 407, 418-419 (1992) ("The existence of alternative dictionary definitions * * *, each making some sense under the statute, itself indicates that the statute is open to interpretation.").

Even if the dictionaries and texts were more uniform in using the terms "solid" or "rock" to describe coal, it would be unsound to isolate and rely selectively on those terms to answer the question presented here. Petitioners' dictionaries and texts use the terms "rock" or "solid" to describe either the appearance or the specific petrographic characteristic of coal—they do not use those terms to define the composition of coal or the relationship between coal and CBM.[9] Indeed, the sources that petitioners themselves cite for the proposition that coal means "*solid* coal" quite specifically contradict petitioners' facile assertion that, with respect to the issue presented here, "the meaning of 'coal' is clear as day." Pet. Br. 43.

For example, Van Krevelen's comprehensive text, *Coal*, observes at the very outset that there is a "diversity of scientific approaches" for characterizing coal depending on the purpose of the scientific inquiry:

> Coal is a rock, a sediment, a conglomerate, a biological fossil, a complex colloidal system, an enigma in solid-state physics and an intriguing object for chemical and physical analyses.

Van Krevelen 4. Van Krevelen devotes the first 10 chapters of his book to explaining each of those different perspectives. *Id.* at 5-332. He ultimately states that current scientific knowledge indicates that "the *principal component* of [bituminous] coals consists of a porous cross-linked macromolecular network in which *a complex mixture of soluble molecules is intimately sorbed.*" *Id.* at 598 (emphasis added). Accord Larson & Gorbaty 444-445; Bend Aff., JA 305-306; Levine Aff., JA 346-347; Marsh Aff., JA 385-387; see also C.A. App. 803-811 (Marsh's pictorial illustrations of coal's molecular structure). That description stands in stark contrast to petitioners' simplistic and scientifically unsound assertion

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[9] The various Interior Department regulations and publications that petitioners cite follow that pattern as well. See Pet. Br. 24. Those regulations and publications simply describe the general appearance and classification of coals; they do not speak, one way or the other, as to whether CBM is a constituent of coal.

that coal is a "solid" or "rock" and its reservation therefore cannot include CBM.[10]

Petitioners' contention is particularly dubious because, at the time that Congress acted, government geologists knew and had informed Congress that coal contained hydrocarbon gases, including gases that may be present in an "occluded" state. The United States Geological Survey (USGS) reported to Congress, in H.R. Doc. No. 1538, 60th Cong., 2d Sess. (1909), as follows:

> The gas which escapes from coal may exist within the mass of the coal in three possible conditions. It may be mechanically held or imprisoned in minute pores, cavities, or cracks throughout the coal; it may be occluded or dissolved within the substance of the coal; or it may be the result of slowly operating chemical reactions, such as the those which have produced the coal from the original vegetable matter.

USGS, Dep't of the Interior, *Notes on Explosive Mine Gases and Dusts, with Special Reference to Explosions in the Monongah, Darr, and Naomi Coal Mines* (1909) (JA 433); accord Bureau of Mines, Dep't of the Interior, *The Escape of Gas From Coal* (1911) (JA 511-513). See also Chamberlin, *The Gases in Rocks* 35, 57-61 (1908) (describing "occluded gases"). Hence, the government's geologic experts of that era had directly related to Congress that coal was not a homogeneous solid, but in fact contained gaseous constituents, and they presciently recognized that the gas might "be occluded or dissolved within the substance of the coal." Indeed, the USGS report quite clearly treated even mechanically held gas as a constituent of the coal. The report

[10] Although petitioners cite Van Krevelen's text (Pet. Br. 7) for the proposition that coal is a "rock," they fail to mention the more pertinent portions of his book.

noted that heating coal "caused the expulsion of *such uncombined gas as was ready to escape at ordinary temperatures*, and in addition developed some new gas from *the nongaseous constituents* of the coal." JA 468 (emphasis added).

Those scientists understood that there is nothing unusual in the fact that a "solid" substance can have gaseous constituents. Indeed, it is commonplace to use terms such as "solid," "liquid," or "gas" to describe the aggregate or predominant qualities of a substance that consists of a mixture of solid, liquid, and gaseous ingredients.[11] The same holds true for coal. Congress reserved "coal" by name, and it is reasonable to interpret "coal" to include all of coal's naturally co-existing constituents, including components that would be liquids or gases if physically separated from the coal.

b. Petitioners' reasoning is also unsound in light of its practical consequences. Petitioners' assertion that Congress reserved only "*solid* coal" would necessarily lead to the untenable conclusion that Congress not only failed to reserve CBM, but that it also failed to reserve other sorbed coal components, including water and "volatile" matter, that are commonly present in, and treated as components of, coal.[12]

[11] Many organic and inorganic substances that might be described for definitional purposes as either "solid" (*e.g.*, wood, resin, cheese, paste, peanut butter, and jelly) or "liquid" (*e.g.*, glue, petroleum, salad dressing, paint, ink, milk, and mineral water) consist of a mixture of two or more coexisting liquid, gaseous, or solid components. Similarly, a substance that might be described as a "gas"—such as the ambient air or the exhaust gases of a car, fireplace, or other combustion process—may include solid particulates and droplets of moisture. The fact that a substance might be characterized in aggregate as a solid, liquid, or gas does not mean that the other, less obvious components are not essential constituents. See also note 2 (discussing colloidal systems).

[12] See American Geological Institute, *Dictionary of Geological Terms* (1980) (JA 372) (defining coal as "a readily combustible rock containing more than 50% by weight and more than 70% by volume carbonaceous

Indeed, the ASTM standards for classifying coal (see page 3, *supra*), distinguish varieties of coal on the basis of a number of factors, including the presence of "moisture" and "volatile" matter. It would be quite strange to conclude that Congress's reservation of coal did not extend to coal components that determine the identifying characteristics of different coals. See Marsh Aff., JA 372, 377, 379-381, 387-388, 393, 398.[13]

Petitioners' reasoning that Congress reserved only "*solid* coal" would also lead to the even more extraordinary result that Congress did not reserve "coal extracts," which include other small hydrocarbon molecules, in addition to CBM, that are present within the macromolecular structure of coal and can be extracted through the use of appropriate solvents. See Van Krevelen 549-600; Larson & Gorbaty 444-445. Coal extracts comprise "[a]s much as 25% of many coals." *Id.* at 444. They "are natural ingredients of the coal" (Van Krevelen 600) and include molecules that would be liquids outside of that macromolecular coal structure. See *id.* at 596-597; see also Larson & Gorbaty 444-445; Levine Rep., JA 590-591; Tissot & Welte, *Petroleum Formation and Occurrence* 248-249 (2d ed. 1984) (Tissot & Welte). Under petitioners' reasoning, Congress failed to reserve those potentially removable "natural ingredients"—and instead gave them to surface homesteaders—because coal extracts are not part of the "*solid* coal."

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material, including inherent moisture"); see also, *e.g.*, Levine Aff., JA 345-346; Bend Aff., JA 304; Marsh Aff., JA 398.

[13] To be sure, the ASTM test for "volatile matter" involves heating the coal and therefore includes both matter that is volatile at ambient temperature and matter that becomes volatile as a result of thermal decomposition. See Levine Rep., JA 595 note 4. Nevertheless, the point remains that, under petitioners' construction, the portion of that "volatile matter" that is not a thermal decomposition product must be considered a non-ingredient of the coal. See Levine Aff., JA 349.

c. Petitioners' attempt to define "coal" as a subset of itself—namely, "*solid* coal"—illustrates the fundamental problem with petitioners' argument. Coal is a complex mixture of solid, liquid, and gaseous hydrocarbons that collectively constitute "coal." It does not exist in the forms of "solid," "liquid" and "gaseous" coal. Coal has the aggregate characteristics of a solid, but it also consists of moisture and liquid and gaseous hydrocarbons. It is the infinitely varied combination of its solid, liquid, and gaseous constituents that defines and determines the characteristics of individual coals. See Levine Aff., JA 345-347; Marsh Aff., JA 381-388; Bend Aff., JA 304-305. Hence, it should come as no surprise that, when Congress has defined the term "coal" in other statutory contexts, it has consistently done so by reference to the varieties of coal that embody those naturally occurring mixtures of different constituents.[14]

At bottom, what petitioners really mean by "solid coal" is "degasified coal"—the non-naturally occurring substance that their exploitation of CBM would leave behind. Indeed, petitioners apparently coined the term "solid coal" solely for the purpose of this case. Tomkeieff's lexicon of coal nomenclature, *Coals & Bitumens* (1954) (Tomkeieff), which petitioners cite (see Br. 9), contains hundreds of descriptive coal terms—including, for example, "stink coal," "tar coal," "mushy coal," "leaf coal," "curly coal," and "smush"—but it nowhere mentions "solid coal." At the same time, that lexicon lists no less than 23 varieties of "high volatiles coal" (Tomkeieff 116), including "gas coal," "bottle coal," and "fat coal," and also defines additional names for such coal,

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[14] See, *e.g.*, 30 U.S.C. 552 ("'Coal' means any of the recognized classifications and ranks of coal, including anthracite, bituminous, semibituminous, subbituminous, and lignite."); 42 U.S.C. 8302(a)(5) ("The term 'coal' means anthracite and bituminous coal, lignite, and any fuel derivative thereof.").

including "parrot coal" ("from the chattering noise it makes on burning" (*id.* at 73)) and "singing coal" (which describes "coal from which gas escapes with a hissing sound, particularly if the surface of it is wet" (*id.* at 85)).

Tomkeieff's lexicon captures the practical knowledge and understanding of miners and the mining industry. Since the advent of large-scale mining more than a century ago, miners have known that "coal" is a highly variable mixture of substances, that its ingredients can include gaseous components, and that the presence of those gaseous components can be so distinctive as to distinguish one variety of coal from another. The plain and descriptive language of those who work the mines provides additional evidence that petitioners are incorrect in asserting that the 1909 and 1910 Acts unambiguously reserved only what they call the "solid rock" and not the gaseous constituents of the coal.[15]

2. *The "Historical Context" Of The 1909 and 1910 Acts Does Not Support Petitioners' Construction.* Petitioners are wrong in asserting that "the history and context of the 1909 and 1910 Acts, and their place in the progression of public lands statutes, verify that Congress only intended to reserve coal (and not gas) to the United States." Pet. Br. 27.

[15] Petitioners' remaining "plain meaning" argument—that the "surrounding provisions of the 1909 and 1910 Acts" also support their construction (Pet. Br. 25-27)—is without merit. The provisions that petitioners cite say nothing about the matter at issue here: a homesteader could use "coal" for "domestic purposes" (*id.* at 25) and an entryman could contest whether land was properly classified as coal land (*id.* at 25-26) whether or not the reserved "coal" included CBM. The more significant such provisions are those that refer to "coal deposits" (35 Stat. 844). Those provisions suggest that Congress was reserving the coal "beds" or "strata" rather than some ill-defined "solid" subset of those naturally occurring "deposits." See USGS, Dep't of the Interior, *The Valuation of Public Coal Lands* (1910) (JA 505-507) (describing deposits on the basis of beds or strata). See discussion at pages 32-41 *infra*.

Petitioners begin from the mistaken premise, discussed above, that "coal" cannot have gaseous constituents that are reserved as part of the coal. But even apart from that erroneous premise, petitioners' historical presentation provides an incorrect picture of congressional intent. The court of appeals' analysis presents the more accurate view of the historical record. Pet. App. 24a-32a. We supplement the court's treatment with several observations in response to petitioners' specific assertions.

a. Petitioners assert that Congress's reservation of "coal" reflects congressional efforts to redress a crisis in the supply of "*solid* coal" with minimal encroachment on settler property rights. Pet. Br. 27-28. The legislative record, however, does not bear out petitioners' focus on what it calls "*solid* coal." The legislative record of the 1909 and 1910 Acts, including their text and their enactment history, indicates that Congress reserved first "all coal" (35 Stat. 844) and then synonymously "all the coal" (§ 3, 36 Stat. 584) in lands classified as valuable for coal—it says nothing about reserving only the "solid" constituents. Congress did not use petitioners' newly minted term "solid coal," nor did it express a special interest in reserving only "degasified coal." Rather, Congress reserved the totality of coal that nature had deposited in the coal-bearing lands, including coal deposits that were not then valuable, but could be valuable "in the future." See Pet. App. 29a-30a. As the court of appeals observed, Congress had no reason to reserve the entirety of all the coal deposits and at the same time silently exclude potentially valuable gaseous constituents that formed with, and could not be readily separated from, what petitioners call the "solid" coal. *Id.* at 30a.[16]

[16] Indeed, it would have been quite remarkable for Congress to separate ownership of the coal from ownership of CBM in light of the hazards that escaped CBM posed to miners. The coal lessee was generally

Petitioners' argument stands on a particularly weak footing because the historical record indicates that Congress actually had strong practical reasons to reserve the gaseous components of the coal as a potential energy source. At the turn of the century, the United States relied on three primary sources of energy: coal, oil and wood.[17] Natural gas was not yet an important source of energy because there was no pipeline system in existence to transport that commodity to consumers. Nevertheless, coal could be transported, and beginning in the 1800s, it was shipped to cities to make "water gas" and "producer gas" as a source of energy. See Bureau of Mines, Dep't of the Interior, *The Status of the Gas Producer and the Internal-Combustion Engine in the Utilization of Fuels* (1912) (JA 524-526); Perry, *The Gasification of Coal*, 230 Sci. Am., No. 3 (Mar. 1974) (JA 530-534). "Nearly every major city in the eastern U.S. once had its gashouse, where gas was manufactured (usually from coal) for lighting and cooking." JA 530.

The formerly common practice of using coal to make gas is significant, because it demonstrates that Congress had a concrete interest in reserving coal's gaseous components, which were liberated through the coal gasification process

responsible under both federal and state law to protect its miners and the public from the emissions of hazardous mine gases. See, *e.g.*, *Deserant* v. *Cerillos Coal R.R. Co.*, 178 U.S. 409 (1900). Congress had no reason to transfer that CBM, and the potential liability for its release, to the agricultural homesteader, who had no conceivable use for the substance. See Pet. App. 20a-21a.

[17] In 1907, the USGS reported to Congress that "[w]ood already is almost a thing of the past; oil, although used extensively in some parts of the country for the production of power, is necessarily of limited occurrence and before long may cease to be an important factor in the problem. Coal, therefore, is the fuel of the present, and, so far as can be seen, will continue to lead in this particular for a long time to come." H.R. Doc. No. 823, 59th Cong., 2d Sess. (1907) (JA 404).

and used as a component of "producer gas." The first step of the coal gasification process was to heat or "distill" the coal, which "releases a certain amount of gas that has a fairly high B.t.u. content because methane (CH_4) and other higher hydrocarbons contained in the coal are among the first components to emerge as the coal decomposes." JA 532.[18] The yield of liberated methane was relatively small, but the process nevertheless put coal's gaseous components to productive use. In light of that use, it is improbable that Congress, which reserved even coals of no present value, would have intended to exclude coal's gaseous components from its reservation of coal. As the Bureau of Mines pointed out, many low-grade western coals "cannot be used in boiler furnaces and will not bear long transportation, but the gas producer makes them of potential value." JA 526.

Petitioners also argue that the statements of Representative Mondell, one of the sponsors of the Coal Lands Acts, who opposed extending the reservation to other minerals, indicate that Congress did not intend to reserve CBM. See Pet. Br. 29-31. Reliance on the statements of a single legislator is, of course, a hazardous method of determining congressional intent.[19] But, in any event, Representative Mondell's

[18] We note that the author of this article, like other contemporary scientists and the miners and geologists of an earlier era, unhesitatingly treats "methane" and "other higher hydrocarbons contained in the coal" as "components" of the coal. JA 532.

[19] It is particularly hazardous here, because Representative Mondell was generally an opponent of conservation legislation. President Roosevelt described Mondell as "'a Congressman who took the lead in every measure to prevent the conservation of our natural resources" and "who consistently fought for local and private interests as against the interests of the people as a whole.'" Swenson 727 (quoting Roosevelt, *An Autobiography* 363, 393 (1913) (1924 rep.)). Mondell candidly admitted that his perspective reflected a minority view. In a colloquy with other Western representatives, he stated that "we must recognize this fact, that in the country at large public sentiment was behind President Roosevelt, and

views do not support, and actually weigh against, petitioners' interpretation. Mondell did not express any explicit view on whether the term "coal" includes CBM. Petitioners instead look for support from a floor colloquy in which Mondell expressed his opposition to a suggestion that Congress reserve "other fuels, such as gas and oil." *Id.* at 30 (quoting 45 Cong. Rec. 6044 (1910)). Mondell's rationale actually undermines petitioners' argument.

First, Representative Mondell stated that "the answer that really controls here" is that "coal crops out and comes to the surface, and its presence is therefore apparent," while oil and gas are "found here and there." 45 Cong. Rec. 6044 (1910). CBM presents no such difficulties because it, by definition, exists only in the readily recognized coal seams. Second, Mondell added that "[o]il and gas present much greater difficulties, when we propose to separate the surface from the mineral, than coal. *I question whether we should provide for surface entries of such lands.*" *Ibid.* (emphasis added). In other words, he did not view the "coal lands" at issue as containing "oil and gas." Mondell undoubtedly knew what was then common knowledge and what the USGS had made clear to Congress—that coal contains what we now call CBM. See pages 24-25, *supra*. Nevertheless, he plainly did not equate CBM with the natural gas that was the subject of the colloquy. Rather, like the USGS, he apparently viewed CBM as a constituent of the coal.

b. Petitioners next argue that public lands statutes enacted after the Coal Lands Acts demonstrate that Congress did not intend to reserve CBM. Pet. Br. 31-36. Peti-

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has been behind President Taft, and that the principal complaints that have been made, save those that have been made by some of us from the West, have been not that there was too much withdrawal, but that there was not enough withdrawal, or that there was too much restoration." 45 Cong. Rec. 4644 (1910).

tioners contend that, because Congress explicitly reserved "gas" in subsequent enactments, including the Act of August 24, 1912, ch. 367, 37 Stat. 496; the Agricultural Entry Act of 1914, ch. 142, 38 Stat. 509; and the Stock-Raising Homestead Act of 1916, ch. 9, 39 Stat. 862, Congress must not have intended to reserve CBM in the 1909 and 1910 Acts. That reasoning, like petitioners' mistaken reliance on Representative Mondell's statements, overlooks the obvious answer to this supposed anomaly—Congress viewed coal (including the CBM constituent) as one mineral estate and "oil and gas" (including gas in non-coal formations) as another.

This distinction is consistent with the way the federal and state courts at the turn of the century resolved disputes respecting ownership of both seemingly fixed minerals, such as coal, and seemingly fugacious minerals, such as oil and natural gas. The courts generally treated the grant or reservation of a fixed mineral as conveying ownership of the mineral in place, so that the owner had a property interest in the underground stratum in which the mineral resides.[20] In

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[20] See, *e.g.* 1 Ricketts, *American Mining Law* 600 & note 10 (1948) (Ricketts) ("it is familiar law that there may be two freeholds in the same body of land, that is to say, a freehold in the surface soil and enough of the earth lying beneath the surface to support it, and a freehold in the minerals underneath the surface estate, with a right of access to mine and extract the minerals"); *id.* at 602 note 25 ("Each of the separate layers or strata becomes a subject for taxation, of incumbrance, levy and sale, precisely like the surface."); Morrison & De Soto, *Mining Rights on the Public Domain* 300 (15th ed. 1917) (severance of a mineral estate "amounts practically to a partition on a horizontal plane"); 1 Lindley, *American Law Relating to Mines and Mineral Lands* 18 (3d ed. 1914) ("[T]he different strata of the subsoil might be shown to be the subject of different rights. * * * Thus, one person might be entitled to the iron, and another to the limestone. One seam or stratum of coal, if in the same lands, might belong to a third person, and another distinct seam to a fourth owner."); *id.* at 1996-1997 (same); *id.* at 2003-2004 (describing the Coal Lands Acts as an example of such "severance of title"); see also, *e.g.*,

the case of oil and gas, the courts were deeply divided on the theories of ownership.[21] They nevertheless generally agreed that the owner of the oil and gas estate could "capture" whatever material he could draw from a lawfully drilled well.[22] Where the oil and gas estates existed as separate strata, the courts recognized that the owner of a particular oil and gas stratum could not drill into and invade a mineral stratum owned by another.[23]

Cherokee & Pittsburg Coal & Mining Co. v. *Board of County Comm'rs*, 80 P. 601, 602 (Kan. 1905) (creation of a separate mineral estate results in land being "divided horizontally"); *In re Major*, 134 Ill. 19, 22 (1890) (as a result of a coal reservation, "ownership of the coal was severed from the ownership of the soil"); *Sanderson* v. *City of Scranton*, 105 Pa. 469, 474 (1884) (coal lease was in effect "a severance of the surface from the underlying strata, as created a divided ownership in these distinct portions of the land"); cf. *Pennsylvania Coal Co.* v. *Mahon*, 260 U.S. 393, 412 (1922) ("The deed conveys the surface, but in express terms reserves the right to remove all the coal under the same.").

[21] Some States embraced the non-ownership view and held that no one owned oil and gas until it was actually produced; others took the view that the surface owner had a "qualified ownership"; others took the view that oil and gas, like fixed minerals, could be "owned in place"; and others focused on ownership of the strata in which the oil or gas resided. 1 Williams & Meyers, *Oil and Gas Law* § 203 (1996) (Williams & Meyers) (discussing the four primary theories). It is difficult to decipher which States had adhered to a particular theory at any given time, but the "ownership in place" theory is now the majority view. *Id.* § 203.3. See also *id.* § 203, at 32.2 (chart showing current approaches of the various States). Contrary to petitioners' incomplete portrayal of the law (Pet. Br. 25, 39-40), the "qualified ownership" theory followed in Oklahoma, see *Champlin Refining Co.* v. *Corporation Comm'n*, 286 U.S. 210, 233 (1932), and the "nonownership theory" followed in Indiana, see *Ohio Oil Co.* v. *Indiana*, 177 U.S. 190, 209 (1900), reflect minority views.

[22] See generally Williams & Meyers § 204.4 (discussing rule of capture).

[23] A commentator from California (a "nonownership" State) described the principle as follows: "Oil and gas are often found in separate and distinct strata under the surface of the soil, and these strata are entirely

Those principles suggest how Congress likely viewed the matter in 1909, and how—until Congress specifies otherwise—this Court should view the matter now under the 1909 and 1910 Acts. CBM that resides within a coal stratum (which is the status of the CBM at issue here, Pet. App. 18a note 8) is part of the coal owner's coal estate, and any attempt by the owner of the relevant non-coal estate to drill into that stratum and extract the CBM therein is a trespass on the coal owner's property rights.[24] But CBM that has migrated from the coal stratum into conventional reservoir rock is no longer a part of the coal estate and may be captured by the owner of the non-coal estate under the rules that govern conventional natural gas.[25] Indeed, that is the approach that

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separate and distinct and disconnected from one another; these different strata of oil-bearing rock or shale are frequently found in a horizontal position and the drilling of a well into one of these strata and the extraction of oil and gas therefrom may not, and usually does not, affect the oil and gas contained in other strata. * * * A lease dividing the lands horizontally and leasing only certain strata thereof would be binding upon the parties. Acting under such a lease *it would be a trespass for the lessee to drill into or in anywise extract oil or gas from any stratum of oil or gas-bearing rock not included within the terms of the lease.*" Ricketts 603 (emphasis added).

[24] See, *e.g.*, *Kansas Natural Gas Co.* v. *Board of County Comm'rs*, 89 p. 750, 752 (Kan. 1907) ("until gas is actually produced and severed, so that it becomes personalty the legal title to, and possession of, the entire volume remain in the owner of the strata in which it is confined").

[25] Under the rules of accommodation, the owner of the non-coal estate may drill *through* the coal stratum to reach oil and gas elsewhere, see, *e.g.*, *Chartiers Block Coal Co.* v. *Mellon*, 25 A. 597, 599 (Pa. 1893), and under the rule of capture, that owner could even drain gas from the coal stratum (assuming it is physically possible to do so) so long as the owner does so from a drilling target placed outside that stratum, cf. Williams & Meyers § 204.4. But that owner could not invade the coal stratum, fracture it, and then remove the CBM that would otherwise remain within the coal seam. Cf. *Kidwell* v. *General Petroleum Corp.*, 212 Cal. 720, 729 (1931) (a lessee

Alabama and Pennsylvania have adopted in resolving questions of CBM ownership.[26]

The approach followed by Alabama, Pennsylvania, and the en banc Tenth Circuit is not only consistent with the historical treatment of "fixed" and "fugacious" minerals, but it also answers petitioners' assertion, made later in their brief, that the law should "deal[] tenderly" with the private parties who own the non-coal portion of the coal lands. See Pet. Br. 42 & note 22. Petitioners recognize that the coalification process generates more CBM than can be retained in the coal strata, and they state that "up to 95%" of the CBM migrates to conventional reservoir rock, where it can be captured by the owner of the non-coal estate. *Id.* at 11.[27] In light of the

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may not "drill into or in anywise extract oil or gas from any stratum of oil or gas bearing rock not included within the terms of its lease").

[26] See *NCNB Tex. Nat'l Bank* v. *West*, 631 So.2d 212 (Ala. 1993)(adsorbed CBM is part of coal estate); *Vines* v. *McKenzie Methane Corp.*, 619 So.2d 1305, 1309 (Ala. 1993) (grant of "all coal" included coalbed methane); *United States Steel Corp.* v. *Hoge*, 468 a.2d 1380 (Pa. 1983) (right to "drill through coal" for gas did not include right to recover adsorbed CBM). But see *Carbon County* v. *Union Reserve Coal Co.*, 898 P.2d 680, 681 (Mont. 1995)(grant of "all coal and coal rights" did not include CBM).

[27] We note that petitioners inconsistently assert, on the following page of their brief, that "up to 60% of the gas in the Fruitland Coal Formation at issue in this case actually migrated *into* the coal seam." Pet. Br. 12. Petitioners cite Scott et al., *Thermogenic and Secondary Biogenic Gases, San Juan Basin, Colorado and New Mexico—Implications for Coalbed Gas Producibility*, 78 AAPG Bull. 1186, 1206 (1994), but they have exaggerated the significance of that article, which was not a part of the record. The Scott article posits that one portion of the Fruitland coal formation (the "high permeability" portion) underwent "secondary biogenesis," (i.e., was metabolized by bacteria late in the coalification process), and the CBM produced therefrom, as well as "thermogenic" (i.e., temperature produced) gases, migrated to the overlaying Kirtland shale formation. See *id.* at 1186, 1204 Fig. 13 (showing migration route). The article suggests that "12-60%" of the "coalbed gases" in "the northern San

tendency of CBM to migrate out of the coal seams over the span of geologic time, the court of appeals' decision is quite generous to surface owners, such as petitioners, who are entitled to capture any such CBM that formed in the coal strata beneath their lands but migrated out of those strata. Petitioners are simply prohibited from removing whatever amount (which may be as little as 5% by petitioners' own estimates) remains within the coal seam.[28]

c. Petitioners next suggest that, if the Coal Lands Acts are construed "in pari materia" with the Mineral Leasing

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Juan Basin" may consist of "migrated thermogenic gases." *Id.* at 1186, 1206. The article, which we have lodged with the Court, does not elaborate on whether any of that broad possible range of "migrated thermogenic gases" includes gas from non-coal sources that have migrated into the coal seam. While it is possible for external gases to migrate into naturally occuring fractures in the coalbed, substantial migration is unlikely. See Marsh Aff. JA 380-381, 395.

[28] Petitioners also make a footnote reference in this portion of their brief (Pet. Br. 36 note 18) to the Act of March 4, 1933, ch. 278, 47 Stat. 1570 (codified at 30 U.S.C. 124) and the Uraniferous Lignite Act (ULA), 30 U.S.C. 541-541e. As a general matter, those enactments are relevant primarily as examples of situations in which Congress has acted to resolve ambiguities in previous statutory grants. We agree with the en banc court that neither of those statutes is instructive on Congress's specific intent with respect to CBM in the 1909 and 1910 Acts. See Pet. App. 31a-32a n.18. In the case of the Act of March 4, 1933, Congress faced the question of whether the surface owner or a potash lessee owned sodium compounds that were intermixed with potash. Congress had not foreseen that problem, and it resolved the ambiguity by allowing agricultural entry onto lands containing the sodium compounds, but reserving the sodium therein. See 30 U.S.C. 124; H.R. Rep. No. 1938, 72d Cong., 2d Sess. (1933). In the case of the ULA, Congress addressed an ambiguity respecting a surface owner's right to remove "source material" (uranium) from lignite deposits. As the court of appeals noted (after questioning petitioners' interpretation of the legislative history), "Congress's allocation of the right to extract uranium in coal cannot be equated to the CBM at issue here because uranium," which is not a hydrocarbon, "is not invariably included in the coal as part of the coalification process." Pet. App. 32a n.18.

Act of 1920 (MLA), 30 U.S.C. 181 *et seq.*, then the coal reservation cannot include gas. Pet. Br. 37-38. That argument is unpersuasive. As we have explained, Congress enacted the Coal Lands Acts to allow settlers to homestead lands classified as valuable for coal, while at the same time reserving public ownership of "all coal" beneath the surface. Congress enacted the MLA a decade later to revise the government's methodology for leasing natural resources—including coal, oil, natural gas, and other minerals—that the United States owned. See 30 U.S.C. 181. The MLA, which applies to a broad range of publicly owned minerals, specifies leasing procedures. It can have no effect whatsoever on the scope of the mineral estate that Congress had previously reserved under the Coal Lands Acts. To be sure, the MLA provides separate provisions for leasing "coal" and leasing "gas" (Pet. Br. 37-38), but those provisions say nothing about whether Congress's reservation of "coal" under other laws includes CBM. The question of what Congress has reserved under the Coal Lands Acts is distinct from the question of how the government chooses to lease it under the MLA.

d. Petitioners also argue that Congress could not have intended to create "an unprecedented and unworkable split gas estate" in which the coal owner would be entitled to the CBM within the coal seam and the surface owner would be entitled to any gas that migrated outside that stratum. Pet. Br. 39. The court of appeals' solution, however, is neither "unprecedented" nor "unworkable." As we have already explained, there is nothing unprecedented in one party owning a coal deposit, including the CBM contained therein, and another party owning the other minerals, including any gas that migrates from the coal seam. See pages 32-36 & notes 20-26.[29] Indeed, two of the three States that have addressed

[29] Notwithstanding their concern for precedent, petitioners base their contentions in this section of their brief on either the "nonownership" or "qualified ownership" theory of oil and gas (see Pet. Br. 39-40), which reflects the approach of a minority of States. As we have explained (note 21, *supra*), most States apply the "ownership in place" theory, under which "the nature of the interest of the landowner in oil and gas contained in his land is the same as is his interest in solid minerals." See Williams & Meyers § 203.3. We do not belabor this point because there is no impediment under any of the theories of oil and gas ownership (or under *Western Nuclear*, see Pet. Br. 49 note 24) to treating CBM as part of the coal. See pages 33-36, *supra*; note 30, *infra*.

the question of CBM ownership—Alabama and Pennsylvania—have expressly adopted that supposedly "unprecedented" approach. See pages 35-36 & note 26; Pet. App. 21a-24a. Furthermore, there is no evidence that the rule adopted by the en banc court and followed for years in Alabama and Pennsylvania is "unworkable"—to the contrary, it appears to be far more practical than the result that petitioners urge.[30]

Petitioners primarily argue that the en banc court's decision is unworkable because "it can be difficult to complete a well only in the coal seam." Pet. Br. 40. But even if that were so (and we think it is not), that is a matter for the *Tribe* and its lessees. Petitioners' obligation is simply to *avoid* drilling to completion targets *within the Tribe's coal seam*, which they can surely do. Petitioners' also contend that there are economies to be gained from using a single

[30] Significantly, although Alabama follows the "nonownership" theory of oil and gas (Williams & Meyers § 203.1, at 34), and Pennsylvania follows the "ownership in place" theory (*id.* § 203.3, at 48), each State treats CBM the same way. The Solicitor of the Interior suggested in a 1990 opinion that Pennsylvania's result depended on a "stratum" theory of gas ownership (Pet. App. 171a), but that is not strictly accurate. Pennsylvania relied on the fact that the coal owner owned the coal strata and that the CBM was part of the coal. See *id.* at 23a. The Solicitor was correct that the Indian Mineral Leasing Act does not authorize an Indian Tribe to grant away its fee interest in an underlying stratum (*id.* at 171a). But nothing in that Act would necessarily prevent a Tribe from *leasing* on a royalty basis the entire coal deposit *or* only the CBM component of that deposit.

well bore and gathering facilities "to produce natural gas from multiple gas-bearing subsurface horizons (both coal and noncoal)." *Ibid.* But if that is the case, then the self- interest of the parties or their lessees should lead them to unitize their efforts. Such agreements are common.[31] Finally, it is not unusual for gas lessees to determine what proportion of their gas production comes from conventional reservoir sources and what proportion comes from unconventional CBM production from coal seams. Indeed, they must do so to qualify for the federal tax credit and to satisfy various state laws.[32]

There is, in short, nothing unworkable in recognizing that the coal owner is entitled to the CBM within the coal seam. Petitioners' theory, in fact, presents the more substantial problems. If the coal owner does not own the CBM, then this Court must assume that Congress intended the federal courts to referee, through the creation of federal common law rules, the inevitable disputes that would arise from dividing ownership of the inextricably intermingled components within the coal seam. For example, the federal courts would need to answer when a federal coal lessee who mines coal, and in the process removes CBM, must pay compensation to the surface owner for conversion of the CBM asset; when the surface owner may enjoin coal operations if the federal coal lessee wastes the CBM, and when the coal owner is entitled to injunctive relief or damages if the surface

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[31] See, *e.g.*, Lewin, *Coalbed Methane: Recent Court Decisions Leave Ownership "Up in the Air," But New Federal and State Legislation Should Facilitate Production*, 96 W. Va. L. Rev. 631, 648 (1994) ("CBM development usually requires a negotiated compromise among gas owners and coal owners, and a 50-50 split is not an uncommon arrangement.").

[32] See, *e.g.*, 26 U.S.C. 29; C.A. Supp. App. 543-544 (citing New Mexico Oil Conservation Division Orders R-8768 & R-8769 (effective Nov. 1, 1988) (requiring that "gas production totals for * * * coal beds and * * * sandstones be kept separately")).

owner's removal of CBM damages the "degasified" coal. Those questions would become even more complex if technology develops to remove liquid "coal extracts" (page 26, *supra*) from coal. See Tissot and Welte 251-252; Hunt, *Petroleum Geochemistry and Geology* 397-408 (2d ed. 1996). We doubt that Congress intended to divide the coal estate in a way that would necessarily create vexing, fact-intensive, litigation. Rather, the simpler answer here is the better one —when Congress reserved coal, it reserved all of coal's constituents, including the CBM present within the coal seam.

B. The Court Of Appeals Properly Invoked The Canon Of Construction That Ambiguity In Public Land Grants Must Be Resolved In Favor Of The Sovereign

Since the early days of the Republic, this Court has repeatedly recognized "the established rule that land grants are construed favorably to the Government, that nothing passes except what is conveyed in clear language, and that if there are doubts they are resolved for the Government, not against it." *Western Nuclear*, 462 U.S. at 59.[33] The reason for this rule is obvious. The Property Clause grants to Congress exclusively the "Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States." U.S. Const. Art. IV, § 3, Cl. 2. The rule of statutory construction that "nothing passes except what is conveyed in clear language" implements the Constitution's express division of authority by ensuring that Congress—and not the Executive or

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[33] *E.g.*, *Andrus* v. *Charlestone Stone Prods. Co.*, 436 U.S. 604, 617 (1978); *United States* v. *Union Pac. R.R.*, 353 U.S. 112, 116 (1957); *Caldwell* v. *United States*, 250 U.S. 14, 20, (1919); *Northern Pac. Ry.* v. *Soderberg*, 188 U.S. 526, 530 (1903); *United States* v. *Arredondo*, 31 U.S. (6 Pet.) 691, 728 (1832).

Judicial Branch—makes the important policy decisions respecting how, when, and to whom the public's property shall be distributed.[34]

Petitioners do not challenge this deeply embedded rule of statutory construction. They argue instead that the court of appeals erred in applying it here. They contend, first, that the court of appeals' identification of the canon at the outset of its decision, rather than the end, "breach[ed] the most fundamental tenets of statutory construction." Pet. Br. 41; see *id.* at 41-42. That argument borders on the frivolous. The court's stylistic decision to identify that principle in the introductory paragraphs of its opinion surely does not mean that the court failed to consider the statutory text or context. To the contrary, the court's textual analysis fully comports with the Court's guidance on construing statutes. See Pet. App. 11a-33a.

Petitioners further contend that the canon has no application because "the meaning of 'coal' is clear as day," Pet. Br. 43-45, and that the court of appeals' analysis of the nature of CBM is "irrelevant and wrong," *id.* at 45-50. Those arguments are also without merit. Petitioners' assertion that the term "coal" plainly means "solid coal" does not withstand scrutiny. As we have pointed out, Congress's use of the term "coal," taken in its ordinary sense at the time the Coal Lands Acts were enacted, refers to the carbonaceous substance that nature deposited and miners mine. See pages 20-22, *supra*. Science confirms in rigorous detail what Congress knew then: coal has aggregate characteristics of a solid, but

[34] The same rationale that justifies the rule also determines the rule's limits. In the specific context of railroad grants, the Court has stated that "public grants are construed strictly against the grantees, but they are not to be so construed as to defeat the intent of the legislature, or to withhold what is given either expressly or by necessary or fair implication." *Leo Sheep Co.* v. *United States*, 440 U.S. 668, 682-683 (1979) (quoting *United States* v. *Denver & Rio Grande Ry.*, 150 U.S. 1, 14 (1893)).

it consists of a mixture of solid, liquid, and gaseous constituents, including CBM. See pages 22-25, *supra*. It would not only be completely unnatural to define the term "coal" as "solid coal," but it would raise a host of practical problems. See pages 25-28, *supra*. The historical context of the Coal Lands Acts does not support petitioners' position, which has been rejected by the majority of state courts that have had practical experience with the matter. See pages 28-41, *supra*. Contrary to petitioners' blithe assertion (Pet. Br. 43), then, the correctness of their proposed construction of the term "coal" is not "clear as day."[35]

The en banc court recognized that petitioners' "plain language" argument rests ultimately on such ipse dixit, and it properly concluded that Congress had not conveyed CBM, either expressly or by fair implication, to homesteaders who occupied the surface of lands containing coal deposits. Congress did not squarely address the issue, but a careful analysis of the statutory language, its specific context, and the broader context of the statute as a whole, *Robinson*, 519 U.S. at 341, demonstrates that the most natural reading of the 1909 and 1910 Acts is that Congress intended to reserve CBM as a constituent of the coal. At the very least, those Acts do not unambiguously *convey* the CBM constituent. The en banc court of appeals was therefore correct to apply the familiar statutory canon that public grants are construed in favor of the government and that nothing passes except what is conveyed in clear language, and to hold that the "coal

[35] As yet additional evidence of ambiguity, we point out that academic commentators have long mooted the question whether "coal" includes CBM. See, *e.g.*, text and cited articles at notes 5 and 31. Furthermore, Congress enacted legislation in 1992 that acknowledged the ongoing debate in various settings and created a framework to assist the States in resolving CBM ownership issues where they arise as a matter of state law. See Energy Policy Act of 1992, Pub. L. No. 102-486, § 1339, 106 Stat. 2986 (codified at 42 U.S.C. 13368).

reserved to the United States in the 1909 and 1910 Acts includes the adsorbed CBM." Pet. App. 32a-33a.

The en banc court's application of the canon to CBM not only makes sense in light of the text and the context of the 1909 and 1910 Acts, but it also makes sense in light of the purpose of the statutory canon. It is clear from the text and legislative history of the 1909 and 1910 Acts that Congress did not expressly consider the important policy questions respecting CBM development on public lands that would inform a decision to convey CBM while reserving the remainder of the coal deposits, and it could not have done so in light of the lack of technology for developing the CBM resource at that time. If this Court agrees with the en banc court, then Congress—the Branch of government that the Constitution charges with such decisions—will have the opportunity to deliberate on the matter in light of current technology and will be able to make a conscious decision based on the public interest. Cf. *Kiowa Tribe* v. *Manufacturing Techs., Inc.*, 118 S. Ct. 1700, 1705 (1998) ("The capacity of the Legislative Branch to address the issue by comprehensive legislation counsels some caution."); note 28, *supra*. If the Court rules for petitioners, however, then those important policy questions will be resolved through happenstance and windfall.[36]

[36] Congress may, of course, ultimately decide to allow the surface owners to develop CBM in those situations in which the government continues to own the coal reserves. It has already done so in the case of surface owners who had previously commenced CBM leasing and drilling activities. See Federal Resp. Br. in Opp. 22-24 (discussing the Enzi Act, Pub. L. No. 105-367, 112 Stat. 3313). If Congress concluded that the equities warranted such action, Congress could also provide special relief for the landowners involved in this unusual case. As we explained in our brief in opposition, the Department of the Interior has failed to identify any non-federal entity, other than the Southern Ute Indian Tribe, that has

C. The Solicitor Of The Interior Acted Properly In Withdrawing His 1981 Opinion

As we have explained, the Solicitor of the Interior issued an opinion in 1981 concluding that Congress had not reserved CBM through the Coal Lands Acts of 1909 and 1910. See pages 11-12, *supra*. The 1981 opinion was subjected to critical scrutiny for the first time in this litigation, where a unanimous court of appeals panel rejected it. The Solicitor carefully reviewed the court of appeals' analysis, first in the panel opinion and then in the en banc decision, and he concluded, in consultation with the Justice Department, that the 1981 opinion was incorrect and should not be defended in this Court. Petitioners have charged that the Solicitor actually withdrew the opinion because he was "intent on preserving at all costs a ruling in favor of the Southern Ute Tribe," and that he acted "in an attempt to short-circuit this Court's review." Pet. Reply Br. 1 (petition stage). Indeed, petitioners go so far as to state that, "[i]n an age of cynicism, it is difficult to imagine a more blatantly political and cynical act than Interior's one-line order." *Ibid.* Petitioner is mistaken.

First, as we explained in our brief in opposition, this Court has itself recognized that government agencies have an obligation to reexamine their legal interpretations on a continuing basis in light of new judicial decisions and insights gained through litigation. See Fed. Resp. Br. in Opp. 25-26; see, *e.g.*, *Estate of Cowart* v. *Nicklos Drilling Co.*, 505 U.S. 469, 476 (1992); *United States* v. *Morton*, 467 U.S. 822, 835-836 note 21 (1984) ("Litigation often brings to light latent ambiguities or unanswered questions that might not otherwise be apparent."). Thus, there was nothing inappropriate in the Solicitor's reexamining the 1981 opinion in light of the court of

succeeded to the United States' reservation of coal under the 1909 and 1910 Acts. Fed. Resp. Br. in Opp. 22.

appeals' decisions. Moreover, the Solicitor's decision to reexamine the question was a matter of public record in the court of appeals. At the rehearing en banc stage, the government informed the court of appeals and the parties that "the panel decision of the court has prompted the Solicitor of the Interior to commence a review of the analysis set out in [the 1981 opinion]" and that the "review is ongoing and could conceivably result in a modification of the views expressed therein." Pet. App. 8a-9a note 2. Indeed, government officials met repeatedly with representatives of both petitioners and the Tribe to discuss the matter.

The government's reexamination of the issue revealed that the Solicitor's 1981 opinion had failed to identify and consider the full range of considerations that had since come to light in the course of defending it in an adversarial context. In addition, like many past agency decisions that did not have the benefit of this Court's more recent statutory guidance, the 1981 opinion did not contain a rigorous evaluation of the text of the relevant statutes. As we explained in our brief in opposition, the reexamination of the 1981 opinion (which included discussions with the parties in this litigation) revealed that the 1981 opinion was deficient and ultimately unpersuasive. Fed. Resp. Br. in Opp. 25-28. Based on that analysis, the Solicitor decided that the opinion was incorrect and should be withdrawn. *Ibid.*

Contrary to petitioners' accusations, the Solicitor did not withdraw the opinion to secure a ruling in favor of the Tribe. We made clear in our brief in opposition (at note 8) that this is not an "Indian law" case and has not been regarded by the United States as such (see note 7, *supra*). The Solicitor withdrew the 1981 opinion because, as we have laid out in the discussion at pages 17-44, *supra*, the legal analysis contained therein is unpersuasive. The United States remains a defendant in the Tribe's action and will continue to assert its valid defenses, but the United States' obligation is

to see that justice is done, and it has no interest in attempting to prevail on an incorrect legal theory. See *Berger* v. *United States*, 295 U.S. 78, 88 (1935). Nor was the Solicitor's decision a "blatantly political" act. The decision was the product of a painstaking and entirely regular deliberative process within the government, with input from petitioners on numerous occasions, and it rests on the legal analysis set out in this brief. That analysis, in turn, places the policy question of CBM ownership squarely in the hands of Congress—which is where it should be.[37]

Petitioners also contend that the Solicitor's withdrawal of the 1981 opinion has unsettled their justified expectations. Pet. Reply Br. 1 (petition stage). The Solicitor gave that matter careful consideration in deciding whether to withdraw the opinion, but he was also obligated to consider certain important facts that petitioners have not highlighted. First, many of the petitioners had commenced the gas leasing or drilling activities at issue in this case *before* the Solicitor had issued his 1981 opinion. Second, the question of CBM ownership was clouded at the time the Solicitor issued his 1981 opinion, see pages 10-12 & note 5, *supra*, and the opinion itself made clear that "nothing in this opinion warrants title to any oil and gas deposit." Pet. App. 159a. Third, the decisions from the Alabama and Pennsylvania courts—as well as a competent title examination—would have put any prudent landowner on notice that title to CBM

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[37] The Solicitor of the Interior withdrew the opinion in a "one-line order" on account of petitioners' own assertions of exigency. After the Solicitor General informed petitioners (following several government meetings with their counsel) that the government would not support their certiorari petition, petitioners opposed the government's request for a 30-day extension of time to file a brief in opposition. The government's request for an extension of time was limited to 14 days, ending on January 4, 1999. That time period did not allow sufficient time for the Solicitor of the Interior to prepare a formal opinion.

was uncertain. And fourth, petitioners (who include a sophisticated multi-national oil company) could have taken steps to reduce their risk of exposure by resolving the title disputes before commencing development. As the court of appeals panel explained, "neither Amoco, the oil industry at large, nor the Department of the Interior have previously assumed the Solicitor's opinion resolved private CBM property rights, as Amoco now advocates it should." *Id.* at 80a note 20 (citing internal Amoco memoranda).

It is well known in the oil and gas industry that "[a]nytime a conflicting claim of title is made to the minerals, subsequent development of the land becomes ultrahazardous." 1 Williams & Meyers, *Oil and Gas Law* § 225, at 386.8 (1996). Petitioners consciously elected to take the "ultrahazardous" step of drilling first and dealing with legal challenges to their title later. Petitioners' claims of reliance must be viewed in that light. Indeed, even if petitioners' reliance interests were stronger, they could not, in the end, determine the United States' position in litigation before this Court. It is inappropriate for the United States to defend a legal position before the Court—even one that it once supported—if the government has concluded that the position is wrong.

CONCLUSION

The judgment of the court of appeals should be affirmed.

Respectfully submitted.

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APRIL 1999

23

Supreme Court, U.S.
FILED
JAN 7 1999
OFFICE OF THE CLERK

No. 98-830

IN THE

Supreme Court of the United States

OCTOBER TERM, 1998

AMOCO PRODUCTION COMPANY, on behalf of itself and the class it represents,*

Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,

Respondent.

On Petition for a Writ of Certiorari to the United States Court of Appeals for the Tenth Circuit

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REPLY BRIEF OF PETITIONERS

As numerous *amici curiae* attest, including the five States primarily affected by the decision below, resolution of who owns coalbed gas in lands patented under the Coal Land Acts of 1909 and 1910, 30 U.S.C. §§ 81, 83-85 ("1909 and 1910 Acts"), is critical to the future of an important and growing national industry, as well as to the financial welfare of thousands of landowners and industry stakeholders. No arguments in the briefs in opposition detract from the national significance of this case or justify the decision of the Tenth Circuit.

Indeed, the only revelation in the briefs is the extraordinary step that the Department of Interior, intent on preserving at all costs a ruling in favor of the Southern Ute Tribe ("Tribe"), has taken in an attempt to short-circuit this Court's review: namely, the issuance, on the date the brief of the United States was due, of a one-sentence order withdrawing a binding opinion of the Solicitor of Interior of 17 years' standing on which the coalbed gas industry was built. U.S. Br. App. 1a.

This was an opinion adopted after a thorough analysis of the statutory language, context, and history that was intended to encourage the development of a desperately needed energy source in the wake of the energy crisis in the late 1970s. It succeeded remarkably, and billions of dollars have been invested in reliance on that opinion. Interior now declares: "never mind," in an action without parallel in the Department's long history. In an age of cynicism, it is difficult to imagine a more blatantly political and cynical act than Interior's one-line order. Petitioners, many of whom are individuals of modest means who have had royalty payments withheld since the panel decision below and are suffering immediate and real harm from the government's breathtaking reversal of position, urge the Court not to permit the federal government successfully to engage in gamesmanship in manipulating this Court's docket. If the federal government really believes that the 1909 Congress meant to reserve

gas when it reserved coal, then let the issue be briefed and decided by this Court on the merits now.

I. Respondents contend that petitioners exaggerate the impact of the decision below. Tribe Br. 13-14; U.S. Br. 21. But the Court need not rely solely on the parties' representations to judge the importance of this case. Five States encompassing almost 90% of lands with coal reservations under the 1909 and 1910 Acts urge this Court to grant a writ of certiorari . They emphasize the economic dislocation, hardship to individual citizens, and tax impacts that flowed directly from the Tenth Circuit's judgment.[1] Counties where the consequences are the most dire also support immediate review by this Court. Moreover, *amici curiae* from across the coalbed gas industry—representing producers, pipelines, and landowners—uniformly attest to the industry disruption and uncertainty that the Tenth Circuit's decision has generated outside the lands contested in this case, notwithstanding passage of the Enzi Act.[2]

Predictably, the respondents vaguely suggest, without serious analysis, that the Enzi Act removes the need for immediate review by this Court. To the contrary, the Act's proponents repeatedly emphasized its limited protection and the need for Supreme Court review of the Tenth Circuit's decision. See, *e.g.*, Cong. Rec. H10,937 (daily ed. Oct. 15, 1998) (remarks of Rep. Cubin) ("we

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1 *See Public Lands Statistics* 54-55 (1997) (state-by-state breakdown of land patents). These same States also contain the majority of the 4.35 million acres of land where oil and gas alone were reserved to the United States under the Act of July 17, 1914, 30 U.S.C. §§ 121-123. *See Public Lands Statistics*, at 54-55. Not only are 1914 Act lands properly considered, *see* Pet. 24 n.13, but, if anything, petitioner's estimate of 20 million affected acres may be too low. *See* Brief of *Amici Curiae* The Coalbed Methane Ad Hoc Committee *et al.* 2-3 ("Independent Producers Br."). Although the five *amici* States are the primary ones affected, 1909 and 1910 Act patents reserving coal have been issued for lands in 17 States, belying the Tribe's claim that this decision has only "local significance," Tribe Br. 13. *See Public Lands Statistics*, at 54.

2 Pub. L. No. 105-367, 112 Stat. 3313 (1998).

expect the United States Supreme Court will grant a writ of certiorari and decide the ownership question"); see also *id.* H10,938-39 (remarks of Reps. McInnis and Rahall). In any event, respondents' blindered focus on the impact of the Tenth Circuit decision on "[t]he current level of CBM development" (*i.e.*, existing wells), U.S. Br. 21, simply misses the point.

The major adverse effect of the Tenth Circuit's decision, undisputed by respondents, is that title to coalbed gas worth billions of dollars is now uncertain in 20 million acres of land in 17 States. Such widespread impairment of the alienability of property is intolerable in any circumstance, but it is especially pernicious in an industry founded on marketable title. See Mountain States Producers Br. 4. In particular, title uncertainty will retard the development of the coalbed gas industry in the 95% of 1909 and 1910 Act lands that are unleased. Cf. Tribe Br. 16 (acknowledging that only 5% of lands are subject to lease). Respondents' dismissal of the importance of unleased lands simply ignores the recent, dramatic changes of the coalbed gas industry.

Historically, the received wisdom was that coalbed gas was commercially recoverable only from "deep coalbeds," Pet. App. 142a; it was assumed that high pressure was necessary to keep sufficient quantities of gas from dissipating from the reservoir. Recently, independent producers in the Powder River Basin in Wyoming began prospecting for gas in shallow coalbeds for lack of any profitable alternatives. They struck paydirt; wells began producing gas in unexpectedly large quantities. A leasing frenzy ensued. See Louise Klee, *Market Watch: Powder River Pipeline Plans Proceed Even As Court Ruling Slows Drilling*, Inside F.E.R.C.'s Gas Market Report, Sep. 18, 1998, *available in* 1998 WL 10043286. As a result, 2250 wells have been drilled or permitted in Campbell County, Wyoming alone in the last three years. Independent Producers Br. 3.

Because of the Powder River Basin experience, the industry is actively exploring future coalbed gas "plays" in

lands never previously thought valuable. Cf. Bureau of Land Management, U.S. Dep't of Interior, 1 *Final Environmental Impact Statement, Record of Decision: Price Coalbed Methane Project* 1-1 (1997) (nearly 1000 prospective wells in the Uintah Basin in Utah). Development typically occurs rapidly if a "play" is discovered. But if title is uncertain, producers risk being held liable in trespass or conversion for all production, and earning no return on substantial upfront capital investment in wells and processing, gathering, and transportation facilities. Producers will either forgo the opportunity, or incur the deadweight cost of entering into expensive protective arrangements with both the coal and the gas owners. The Tribe calls for substantiation of this self-evident point, see Tribe Br. 15, but the Court has all the proof it needs in the numerous *amicus* briefs submitted in support of this petition. The industry participants who will conduct new exploration, production, and transportation of coalbed gas have represented to the Court that title uncertainty created by the decision below has interfered with and will restrict their development activity significantly.

The Court should act now to eliminate the unnecessary and costly legal risk that the Tenth Circuit injected into coalbed gas development.[3] There is no need to await a circuit split. First, it would be detrimental to the industry

[3] The Tribe argues that the Tenth Circuit's decision did not alter the legal landscape because it was consistent with a purported "majority rule" (*i.e.*, two of three state supreme courts) in cases deciding coalbed methane rights under certain private deeds. Tribe Br. 17 & n.6. Those cases turn on the deed language and state-law rules of deed construction, affect only the plots of land at issue, and have no bearing on the meaning of Congress' reservation of "coal" in the 1909 and 1910 Acts (as even the panel below admitted). Pet. App. 48a n.3. The only rule for 1909 and 1910 Act lands, in Alabama and elsewhere, was that established by the 1981 Solicitor's opinion: namely, that coalbed gas belonged to the patentee. Nor are any unresolved issues of state law, U.S. Br. 20, an impediment to coalbed gas development. That industry flourished in the wake of the Solicitor's opinion in 1981 without any apparent obstacles posed by state law. *See* Pet. 24-25.

to leave the ownership of gas unsettled for the years it would take another case to travel to this Court. Not only are the direct effects of the Tenth Circuit decision severe (because many of the major coal basins with known coalbed gas reserves are in that Circuit), but producers must account for the legal risk of title uncertainty in every State with 1909, 1910, or 1914 Act lands. Second, deferring consideration will yield little gain to this Court's review. The legal positions on each side have fully crystallized, and there are five legal opinions for the Court to draw upon (the 1981 Solicitor of Interior, the district court, the panel, the *en banc* majority, and the *en banc* dissenters). In addition, the importance of the issue ensures that the matter will be briefed not only by the parties, but also by numerous *amici*. Thus, the legal issue will be thoroughly vetted before the Court will decide it.

Indeed, the United States acknowedges that "in appropriate circumstances, [it] has asked this Court to address important public land issues in the absence of a circuit conflict." U.S. Br. 15 n.5. It declines to say what the "appropriate circumstances" were in those cases that are absent here. The United States does not dispute that this case involves far more valuable minerals than were at issue in *Watt* v. *Western Nuclear, Inc.*, 462 U.S. 36 (1983). See Pet. 23-24. Moreover, *Watt* v. *Alaska*, 451 U.S. 259 (1981), did not even involve title, but simply the statutory division of mineral leasing revenues. Contrary to respondents' claims, legislation will not resolve the question of title to coalbed gas. Even if Congress were to award title to the owner of the coal estate, the question of pre-existing title in the patentee would simply arise again in the form of takings claims. The fact that the United States may be the primary owner of still severed coal estates in 1909 and 1910 Act lands, U.S. Br. 22, also does not make curative legislation likely. Congress has already declined to relinquish to landowners any possible ownership claims to coalbed gas reserves worth billions of dollars in unleased lands. See Pub. L. No. 105-367, § (1)(b)(5).

Nor should review be delayed pending trial on the merits of the various equitable defenses petitioners have asserted. The critical and dispositive issue for review—the meaning of the reservation of "coal" in the 1909 and 1910 Acts—is strictly legal in nature and has been finally decided. Moreover, this case is many years away from final judgment. Not only must there first be resolution of the defenses "common" to all petitioners, but there will follow protracted discovery and trial on the *individual* defenses of the approximately 3,000 class members.

In addition, neither respondent even bothers to address the nationwide uncertainty created by the ruling below as to entitlement to federal tax credits for those with an economic interest in development of coalbed gas. See Pet. 27-28. Taxpayers—including royalty owners, producers, and investors in financial trusts—simply will not know the status of those credits. The silence of the United States on a major issue of federal tax liability is deafening.

Finally, even respondents cannot diminish the financial hardship to the almost 3,000 farmers and ranchers who have been deprived of the millions of dollars of needed royalty income escrowed in the wake of the decision below. Instead, the Tribe tries to pin the blame on Amoco and other producers, arguing illogically that royalties should have been escrowed earlier (thereby exacerbating the hardship). See Tribe Br. 18-19.[4]

The United States also faults petitioners, curiously relying on a statement in the 1981 Solicitor's opinion that it was not a warranty of title. U.S. Br. 24 (citing Pet. App. 159a). This states the obvious: no patentee has a

[4] Production on the reservation has also been adversely affected; Amoco alone has suspended investment projects that would have raised production by 20% by the year 2000. The Tribe's contrary claims are misleading; the 143 wells were drilled in 1992 largely because that was the last year that federal tax credits were available. As to the tenfold production increase, that owes almost entirely to the hundreds of wells drilled *prior* to the lawsuit, which entered peak production phases after early dewatering periods. *Cf.* La Plata County Br. App. 15a.

cause of action against the United States as grantor for breach of title warranty, see *Black's Law Dictionary* 1588 (6th ed. 1990), but that does not alter the fact that the 1981 opinion was issued to "resolve . . . who owns the coalbed gas in land where the coal or oil and gas was reserved to the United States." Pet. App. 142a. The United States further suggests that petitioners should have negotiated a 50-50 split of royalties between the gas and coal owners. See U.S. Br. 25. It is astonishing to fault property owners who do not surrender 50% of their wealth to foreclose any possible third party claim. This suggestion also ignores that the express purpose of the 1981 Solicitor's opinion was to "expedite development of this energy source" by resolving the title question that had "hindered any decision on how, and under what right of extraction, it can be developed." Pet. App. 142a.[5] The United States cannot escape the fact that the Department of Interior invited reliance on its 1981 opinion it now disavows. Indeed, it is ironic that the United States discounts petitioners' reliance, given that the Enzi Act was designed to preserve the very same reliance interests of others. See S. Rep. No. 105-408, at 2 (1998). The decision below has unsettled ownership of extremely valuable minerals and thwarted legitimate reliance interests, thus causing turmoil in the industry and hardship to individuals. This Court's review is unquestionably warranted.

II. The United States never explains its complete about-face in this litigation. On appeal, the United States "adopt[ed] Amoco Production Company's brief" in full on the meaning of the 1909 and 1910 Acts. Br. for Federal Appellees, No. 94-1579, 28 (May 19, 1995). Although the United States stated to the court of appeals *en banc*

[5] The Tribe's insinuation that the Solicitor issued the 1981 opinion in collusion with Amoco, Tribe Br. 5-6, is irresponsible, and not supported by the United States. First, the issue of coalbed gas ownership was before the Solicitor by virtue of an application of another producer. C.A. App. 2029-30. Amoco filed a lawsuit against the Department to compel administrative action after inordinate delay because it had 38 leases that were about to expire by operation of law. *See* C.A. App. 638, 2051, 2055, 2059.

that its prior views rested on the 1981 Solicitor's opinion, see Pet. App. 8a n.2; in fact, it had originally defended the district court's opinion based on "the plain meaning of 'coal,' the legislative history of the relevant Acts and their historical context, and finally, [] the 1981 Solicitor's Opinion to which the [district] court accorded deference under *Chevron U.S.A. Inc.* v. *Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984)." Federal Appellees Br. 28.

Not only has the United States abandoned the position taken below, but the Department of Interior has now withdrawn the 1981 Solicitor's opinion. The claim that the Department did so after legitimate reconsideration, U.S. Br. 25-26, is belied by the fact that the current Solicitor did not issue a contrary opinion in the 18 months since the panel decision was handed down, but instead issued a one-sentence retraction order on the date the brief of the United States was due in this Court. The withdrawal order is a transparent attempt to remove the *Chevron* issue from this case because the issue plainly was decided incorrectly below and warrants review for the reasons stated in the petition.[6]

The United States ties itself in knots trying to justify Interior's change of position. It assures the Court that the 1981 opinion "was reasonable at the time it was rendered," U.S. Br. 25, but not now in light of "current perspectives on statutory construction" and the opinion below, *id.* at 27. Petitioners are unaware of any sea change in statutory construction in the last 17 years, and the

[6] The assertion, U.S. Br. 19, that *Chevron* may not apply to post-conveyance determinations of title by Interior is unfounded. This Court long ago ruled that Interior is vested with "the control of all matters affecting the disposition of the public lands of the United States, and the adjustment of private claims to them under the legislation of Congress," precisely to ensure certainty of title. *Barden* v. *Northern Pac. R.R. Co.*, 154 U.S. 288, 326 (1894). The additional suggestion that the Court does not grant certiorari merely to review "application of *Chevron* principles" curiously overlooks *United States* v. *Haggar Apparel Company*, No. 97-2044.

critique by the United States of the 1981 opinion in light of the decision of the court of appeals is unpersuasive.

The United States wrongly attacks the 1981 opinion for supposedly focusing on the word "coal" and certain legislative colloquies without considering " 'the broader context of the statute as a whole.' " U.S. Br. 27 (quoting *Robinson* v. *Shell Oil Co.*, 117 S. Ct. 843, 846 (1997)). First, the word "coal" is the operative statutory language that identifies the mineral reserved to the United States; because Congress did not refer to natural gas found in coal formations in 1909, such gas belongs to the patentee.[7] Second, the charge is untrue, for the 1981 opinion examined not only the word "coal" and the legislative debates, but discussed at length the character of the minerals at issue, the entire historical context of the coal lands crisis resolved by the 1909 and 1910 Acts, and the progression of statutes dealing with mineral reservations and leasing. See Pet. App. 143a-52a.

The United States next takes the 1981 opinion to task for relying on a Pennsylvania trial court decision that was overruled. However, the Department of Interior, in an as yet unretracted 1990 Solicitor's opinion, subsequently declared that case irrelevant because it is based on Pennsylvania's unique geology and "stratum theory" of minerals

[7] The petition exposes the Tenth Circuit's misreading of contemporaneous texts that it claims suggest that coal was partly gas, *see* Pet. 18 n.7, and neither respondent answers that analysis. The Tribe instead contends there are "repeated references" to gaseous constituents of coal, but its lone example does not support its claim. Tribe Br. 24 (quoting IV *The American Cyclopaedia: A Popular Dictionary of General Knowledge* 726 (G. Ripley & C. Dana eds., 1883)). This source is not referring to hydrogen or oxygen found in a gaseous state in coal reservoirs; rather it is referring to the presence of hydrogen and oxygen in the atomic structure of *solid* coal. *See* IV *Cyclopaedia* at 726, 737-38. The Tribe also conveniently omits the fact that the entry begins by defining "coal" as a solid. *Id.* at 726. In addition, the Tribe's attempt to rely on the statutory reference to coal "deposits" does not support its analysis. *See Andrus* v. *Shell Oil Co.*, 446 U.S. 657, 658 n.1 (1980).

ownership that is inapplicable to federal lands. Pet. App. 169a-71a.

Finally, the United States criticizes the 1981 opinion for failing to analyze congressional understanding of the scientific "origins, structure, and composition of coal" in 1909 and 1910. U.S. Br. 27. That criticism runs afoul of this Court's admonition that a "strictly scientific" definition of a mineral "is not the test contemplated by the statute," and that words identifying minerals should be given "their ordinary and popular sense." *Burke* v. *Southern Pac. R.R. Co.*, 234 U.S. 669, 679 (1914). In any case, not only is there nothing unique about the state of natural gas in coal (as the Solicitor of Interior concluded in his 1990 opinion), Pet. App. 165a, but also it is fanciful to think that the state of gas *in situ* in coal reservoirs had any effect on Congress in 1909 or 1910. See Horace C. Porter & F. K. Ovitz, *The Escape of Gas From Coal* 3 (1911) (Dep't of Interior, Bureau of Mines Technical Paper) ("little is known as to the condition of [methane] gas in the coal"). As set forth in the petition, Pet. 16-21, it is the court of appeals ruling, and not the 1981 Solicitor's opinion, that is an indefensible interpretation of the 1909 and 1910 Acts.

CONCLUSION

The petition for a writ of certiorari should be granted.

Respectfully submitted,

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Supreme Court, U.S.
FILED
MAR 4 1999
CLERK

No. 98-830

In The

Supreme Court of the United States

October Term, 1998

AMOCO PRODUCTION COMPANY,
on behalf of itself and the class it represents,

Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,

Respondent.

On Writ Of Certiorari
To The United States Court Of Appeals
For The Tenth Circuit

AMICI CURIAE BRIEF OF MOUNTAIN STATES LEGAL FOUNDATION, WYOMING FARM BUREAU FEDERATION, MONTANA FARM BUREAU FEDERATION, UTAH FARM BUREAU FEDERATION, AND NEW MEXICO FARM & LIVESTOCK BUREAU IN SUPPORT OF PETITIONERS

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AMICI CURIAE BRIEF OF MOUNTAIN STATES LEGAL FOUNDATION, WYOMING FARM BUREAU FEDERATION, MONTANA FARM BUREAU FEDERATION, UTAH FARM BUREAU FEDERATION, AND NEW MEXICO FARM & LIVESTOCK BUREAU IN SUPPORT OF PETITIONERS

Mountain States Legal Foundation respectfully submits this *amici curiae* brief on behalf of itself, the Wyoming Farm Bureau Federation, the Montana Farm Bureau Federation, the Utah Farm Bureau Federation, and the New Mexico Farm & Livestock Bureau in support of Petitioners. Pursuant to Supreme Court Rule 37(3)(a) this *amici curiae* brief is filed with the written consent of all the parties.[1]

IDENTITY AND INTEREST OF *AMICI CURIAE*

Mountain States Legal Foundation ("MSLF") is a non-profit, public interest legal foundation organized under the laws of the State of Colorado. MSLF is dedicated to bringing before the courts those issues vital to the defense and preservation of private property rights, individual liberties, limited government, and the free enterprise system. MSLF's members include individuals and businesses from every state in the Union. Over one

[1] Copies of the consent letters have been filed with the Clerk of the Court. In compliance with Supreme Court Rule 37(6), *amici* represent that no counsel for any party authored this brief in whole or in part, and that no person or entity, other than *amici* and their members, made a monetary contribution for the preparation or submission of this brief.

thousand of MSLF's members own property in Wyoming, Montana, Utah, and New Mexico.

Wyoming Farm Bureau Federation, Montana Farm Bureau Federation, Utah Farm Bureau Federation, and New Mexico Farm & Livestock Bureau ("Farm Bureaus") are voluntary, non-profit, general farm and ranch organizations incorporated under the laws of their respective States. The Farm Bureaus represent the economic, educational, environmental, and social interests of over 50,000 member families.

Under the Coal Lands Acts of 1909 and 1910, 30 U.S.C. §§ 81, 83-85, Congress reserved the "coal" to the United States and granted the surface and all the other minerals (including oil and gas) to the patentees. Many of *amici's* members own patented lands from which the coal was reserved to the United States pursuant to the 1909 and 1910 Acts. Significant amounts of these lands are located in areas that have huge potential for the production of natural gas from coalbeds, *e.g.*, the Powder River Basin in Wyoming and Montana, the Green River Basin in Wyoming, the Uinta Basin in Utah, and the San Juan and Raton Basins in New Mexico.

The U.S. Department of the Interior has long recognized that, under the 1909 and 1910 Acts, the United States reserved only the solid rock "coal." *Ownership of and Right to Extract Coalbed Gas in Federal Coal Deposits* (M-36935), 88 Interior Dec. 538 (1981). Based upon this interpretation, many of *amici's* members granted the right to oil and gas companies to explore for and produce the natural gas from coalbeds beneath their lands in return for the payment of royalties.

In a 6 to 3 *en banc* decision, the United States Court of Appeals for the Tenth Circuit ruled that the word "coal" in the 1909 and 1910 Acts was "ambiguous." *Southern Ute Indian Tribe v. Amoco Production Co.*, 151 F.3d 1251, 1257 (10th Cir. 1998). Based upon this purported ambiguity, the Tenth Circuit held that under the 1909 and 1910 Acts the United States reserved the solid rock "coal" and natural gas that is "adsorbed" on the coal. *Id.* at 1267. This decision has disrupted the settled expectations of *amici's* members who have leased their natural gas estate. Under the Tenth Circuit's decision, these members may no longer be able to receive the royalty payments that are a necessary supplement to the income these members earn from their farming and ranching operations that help feed this Nation. These members may also be subject to claims of conversion, trespass, and/or breach of warranty of title. Other members who own lands that are yet unleased, but which contain significant reserves of natural gas in the coalbeds, may never develop their reserves and reap the benefit therefrom because of the Tenth Circuit's decision. Because *amici* and their members have a significant interest in the issue in this case, they respectfully submit this brief in support of Petitioners.

SUMMARY OF ARGUMENT

This Honorable Court should reverse the Tenth Circuit's decision for three reasons. First, the plain meaning of the word "coal" in the 1909 and 1910 Acts proves that Congress reserved only the solid rock "coal." Second, it is axiomatic that coal and natural gas are two separate minerals. The fact that some natural gas is adsorbed on

the coal does not change the natural gas into coal. And, it certainly does not justify the Tenth Circuit's creation of an unworkable split natural gas estate. Finally, the common law has always allowed the owners of split mineral estates to extract their individual minerals, notwithstanding the fact that the two minerals may be closely associated, and notwithstanding the fact that one mineral estate owner may damage the mineral estate of another.

ARGUMENT

I. THE PLAIN MEANING OF THE WORD "COAL" PROVES THAT CONGRESS RESERVED ONLY THE SOLID ROCK "COAL."

The issue in this case involves a simple question of statutory interpretation: does the reservation of "coal" in the 1909 and 1910 Acts include the natural gas found in coalbeds? In interpreting a statute a court must give effect to the intent of Congress. *Griffin v. Oceanic Contractors, Inc.*, 458 U.S. 564, 570 (1982). The controlling intent is the intent of the Congress that passed the particular statute being interpreted. *Leo Sheep Co. v. United States*, 440 U.S. 668, 681 ("[t]he pertinent inquiry in this case is the intent of Congress when it granted land to the Union Pacific [Railroad] in 1862"). The first place to look for that intent is the language of the statute itself. *United States v. Denver & Rio Grande Ry. Co.*, 150 U.S. 1, 10-12 (1893). When looking at the language of the statute, a court must "assume" that congressional intent is reflected by the ordinary meaning of the words used. *United States v.*

Labonte, 117 S.Ct. 1673, 1677 (1997) (*citing Moskal v. United States*, 498 U.S. 103, 108 (1990)); *Russello v. United States*, 464 U.S. 16, 21 (1983).

Applying these well-established principles of statutory construction to the issue in this case reveals that when Congress passed the 1909 and 1910 Acts it reserved only the solid rock "coal." Throughout this Nation's history, the word "coal" has meant the solid rock. *Southern Ute Indian Tribe v. Amoco Production Co.*, 874 F.Supp. 1142, 1154 (D. Colo. 1995). This meaning is in accordance with the definitions of the word "coal" found in the dictionaries and reference works of the early 1900s. *Southern Ute Indian Tribe*, 151 F.3d at 1268 (10th Cir.) (Tacha, J., dissenting).

Although every schoolchild would agree that the word "coal" means the solid rock, the Tenth Circuit presumed that the word was "ambiguous" because neither the 1909 Act nor the 1910 Act defined the word. *Southern Ute Indian Tribe*, 151 F.3d at 1258 ("the Acts neither define coal nor mention [coalbed methane]; thus, the statutes do not by their plain language indicate congressional intent regarding [coalbed methane]"). The Tenth Circuit then placed the burden on Amoco to prove that the word was unambiguous. *Southern Ute Indian Tribe*, 151 F.3d at 1257 ("[t]he burden remains on defendants to dispel any ambiguity").

However, the fact that Congress did not define "coal" in the 1909 and 1910 Acts does not mean that the word is ambiguous. *Southern Ute Indian Tribe*, 151 F.3d at 1270 (Tacha, J., dissenting) ("[s]ilence does not equate with

ambiguity"). If that was true, every undefined word in a statute would be ambiguous. Such a result would make statutory interpretation impossible. That is why undefined words in a statute are to be construed in accordance with their plain meanings. *United States v. Smith*, 508 U.S. 223, 228 (1993) (*citing Perrin v. United States*, 444 U.S. 37, 44 (1979)). Thus, based upon the plain meaning of the word "coal" and simple common sense, Congress reserved only the solid rock "coal" from the lands patented under the 1909 and 1910 Acts.

II. THE TENTH CIRCUIT'S "SCIENTIFIC" ANALYSIS CREATED AN UNWORKABLE SPLIT NATURAL GAS ESTATE.

Based upon its belief that the word "coal" was ambiguous, the Tenth Circuit ventured into the world of colloidal science to justify its conclusion that Congress intended to reserve something more than just the solid rock "coal." Not only was the Tenth Circuit's "scientific" analysis wrong, it shows how desperate the Tenth Circuit was to reach what it believed to be the "right" result in this case.

The Tenth Circuit suggested that Congress in 1909 "may" have considered the natural gas found in coalbeds to be part of the solid rock coal.[2] *Southern Ute Indian Tribe*, 151 F.3d at 1260 ("Congress in 1909 *may have considered* [coalbed methane] to be part of that solid coal")

[2] There is no evidence that Congress in 1909 actually considered the natural gas in coalbeds to be part of the solid rock coal.

(emphasis added). The majority based this conclusion on the fact that some of the natural gas in the coalbeds is physically adsorbed on the surface of the coal. *Southern Ute Indian Tribe*, 151 F.3d at 1260-1261. Accordingly, the Tenth Circuit held that the "coal reserved to the United States in the 1909 and 1910 Acts includes the adsorbed [coalbed methane]." *Id.* at 1267.

However, the fact that the some of the natural gas in coalbeds gas is physically adsorbed on the coal does not change that natural gas into the solid rock coal. Physical adsorption occurs between all gases and solids.[3] Popiel, *Introduction to Colloid Science*, 67 (1978). Physical adsorption is caused by van der Waals forces that attract the natural gas molecules to the surface of the coal. *Id.* at 4-6, 66-68. These van der Waals forces are so weak that the natural gas is removed from the coal by a simple reduction in pressure. *Id.* at 68. More importantly, the physical adsorption/desorption process does not chemically alter either the natural gas or the coal.[4] *Id.* at 68. Thus, despite the effects of physical adsorption, natural gas and the coal remain two separate minerals.

[3] Thus, natural gas is also physically adsorbed on other reservoir rocks, such as sandstone, shale, and limestone. Yet, no one considers natural gas to be a part of those rocks.

[4] This important characterization of physical adsorption differentiates it from chemical adsorption. *Id.* at 66-69. When a gas is chemically adsorbed to a solid, strong chemical bonds are formed between the gas and the solid. *Id.* The application of a large amount of energy is required to break these chemical bonds. *Id.* Consequently, the gas and the solid are chemically altered during the chemical adsorption/desorption process. *Id.*

The Tenth Circuit's "scientific" analysis also ignored the fact that a significant portion of the natural gas migrates away from the coalbed over time and becomes trapped in other reservoir rocks.[5] Under the Tenth Circuit's decision, this natural gas belongs to the surface owner because it is not adsorbed on the coal. Thus, the Tenth Circuit created a split natural gas estate, *i.e.*, the ownership of natural gas now depends on the location of the natural gas. However, the ownership of natural gas (a fugacious mineral) has never been determined by its location, as has the ownership of solid minerals such as coal. *Brown v. Spilman*, 155 U.S. 665, 669-670 (1895). Instead, under the rule of capture, a person owns all the gas that is produced from his well, even if that gas originated underneath his neighbor's land. *Ohio Oil Co. v. Indiana*, 177 U.S. 190, 202-204 (1900). Congress did not intend to redefine the ownership of natural gas so as to create an unworkable split natural gas estate when it reserved "coal" under the 1909 and 1910 Acts.[6]

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[5] The Tenth Circuit expressly refused to address this natural gas. *Southern Ute Indian Tribe*, 1515 F.3d at 1260, n.8. As Judge Tacha pointed out in dissent, the majority ignored this natural gas because it would have put the majority in the awkward position of saying that the natural gas adsorbed on the coal is "coal" but the natural gas that migrated away is not "coal," even though both natural gases came from the same source rock and are chemically identical. *Southern Ute Indian Tribe*, 151 F.3d at 1270 (Tacha, J., dissenting).

[6] That this split natural gas estate is unworkable is further evidenced by the fact that natural gas not only is adsorbed on the coal but also exists as "free gas" in the cracks and fractures within the coal. Rice, Law, and Clayton, *Coalbed Gas – An Undeveloped Resource, in The Future of Energy Gases*, 389, 395 (U.S.G.S. Prof. Paper 1570, David G. Howell ed. 1993). Because

III. THE TENTH CIRCUIT IGNORED WELL-ESTABLISHED PRINCIPLES REGARDING THE OWNERSHIP OF, AND THE RIGHT TO EXTRACT, MINERALS.

The Tenth Circuit concluded that adsorbed natural gas is so "intimately associated" with the coal that Congress in 1909 could certainly have considered it to be part of the solid rock. *Southern Ute Indian Tribe*, 151 F.3d at 1261. However, the common law has always recognized that associated minerals could be separately owned and separately mined. *See e.g., Guffey v. Stroud*, 16 S.W.2d 527 (Tex. Comm'n App. 1929) (separate ownership of oil and natural gas). More importantly, in passing the Uraniferous Lignite Act, 30 U.S.C. §§ 541-541i, Congress expressly acknowledged that the patentees under the 1909 and 1910 Acts were granted all the minerals except coal, including those minerals found in the coalbeds. 30 U.S.C. § 541d (recognizing that patentees owned uranium found in lignite reserved under 1909 and 1910 Acts); H.R. Rep. No. 1478, 84th Cong., 1st Sess. 4 (1955), *reprinted in*, 1955 U.S.C.C.A.N. 2992, 2996 (patentees own "fee simple title to all minerals in the land, including valuable source materials, regardless of the host material or the mode of occurrence"). Thus, the fact that the adsorbed natural gas may be "associated" with the solid rock coal does not

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the Tenth Circuit held that Congress reserved only the natural gas that was adsorbed on the coal, 151 F.3d at 1267, the surface owner would own the "free gas" in the coal. Congress did not intend such an absurd result.

alter the individual identity of either mineral or mean that the owner of the coal owns the natural gas.

In one final desperate attempt to justify its decision, the Tenth Circuit concluded that the adsorbed natural gas must belong to the coal owner because in 1909 that natural gas could not be extracted without "damaging or destroying" the coal. *Southern Ute Indian Tribe*, 151 F.3d at 1261. The Tenth Circuit based this conclusion on its belief that in 1909 the only way to extract the natural gas was to mine the coal and then destroy it by subjecting it to very high temperatures in a laboratory.[7] *Id.* at 1260-1261. This is not true. Natural gas was first piped from coalbeds and used for heating purposes in 1746. Craig and Myers, *Ownership of Methane Gas in Coalbeds*, 24 Rocky Mtn. Min. L. Inst. 767, 768 (1978) (*citing* United States Bureau of Mines, Information Circular No. 7670, *Drainage and Utilization of Firedamp*, 1 (1953)).

More importantly, the removal of the natural gas from the coal does not damage the coal. Granted, the coalbed has to be penetrated in order to remove the natural gas, but the coal retains all of its economic value and all of its uses after the natural gas is removed.[8]

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[7] This process, "destructive distillation," produces gaseous elements through the destruction of the chemical bonds that held those elements together as a solid. The gas produced by "destructive distillation," commonly referred to as "coal-gas," is not at issue here.

[8] This is especially true considering that the coalbeds having the most economic potential for natural gas production are too deeply buried to be mined economically. *See*, Craig and Myers, at 768 ("coal found close to the surface . . . contains little or no gas").

Southern Ute Indian Tribe, 151 F.3d at 1270 (Tacha, J., dissenting). Even if the coal is damaged during the removal of the natural gas, that fact has no bearing on the question of who owns the natural gas. Under the common law, the owners of different mineral estates underlying the same land enjoy a reciprocal relationship regarding their mutual and simultaneous ability to extract their minerals. *Chartiers Block Coal Co. v. Mellon*, 25 A. 597 (Pa. 1893); 2 *Lindley On Mines*, §§ 812, 827 (2d ed. 1903); 6 *Thompson on Real Property*, § 48.20 (David A. Thomas ed. 1994). Thus, the owner of one mineral estate may use the mineral estate of another to exploit his estate and, in turn, must accord the other owner the same consideration, notwithstanding the absence of patent or deed language authorizing such use. 6 *American Law of Mining*, § 200.04[1] (2d ed. 1997). If one owner's use of the mineral estate of another is unreasonable, then the former owner is liable to the latter owner for damages. 6 *American Law of Mining*, § 200.04[1][c].

The law of split mineral estates was well established when Congress passed the 1909 Act and, thereby, created the first split mineral estate on public lands. 2 *Lindley on Mines*, §§ 9, 812; *Del Monte Mining & Milling Co. v. Last Chance Mining and Milling Co.*, 171 U.S. 55, 60-61 (1898). Because Congress did not write the 1909 Act "upon a clean slate," *United States v. Texas*, 507 U.S. 529, 534 (1993), it must be presumed that Congress intended for the common law of split mineral estates to apply to the split mineral estates created by the 1909 and 1910 Acts.[9]

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[9] The common law of split mineral estates is analogous to the common law with respect to split surface and mineral

Isbrandtsen Co. v. Johnson, 343 U.S. 779, 783 (1952) ("[s]tatutes which invade the common law . . . are to be read with the presumption of favoring the retention of long-established and familiar principles, except when a statutory purpose to the contrary is evident"). Thus, the fact that the coal may be damaged during the removal of the natural gas does not mean the coal owner owns the natural gas.

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estates. 2 *Lindley On Mines*, § 812. Congress adopted the common law regarding split surface and mineral estates. *See, Kinney-Coastal Oil Company v. Kieffer*, 277 U.S. 488 (1928). Thus, it is reasonable to conclude that Congress also adopted the common law regarding split mineral estates.

CONCLUSION

For the foregoing reasons, *amici* respectfully request that this Court reverse the decision of the Court of Appeals for the Tenth Circuit.

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Dated: March 3, 1999

Supreme Court, U.S.
FILED
MAR 4 1999
CLERK

(14)

No. 98-830

In The

Supreme Court of the United States

October Term, 1998

AMOCO PRODUCTION COMPANY,
on behalf of itself and the class it represents,

Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,

Respondent.

On Writ Of Certiorari To The United States Court Of Appeals For The Tenth Circuit

BRIEF OF AMICUS CURIAE INDEPENDENT PETROLEUM ASSOCIATION OF MOUNTAIN STATES IN SUPPORT OF PETITIONERS

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BRIEF OF *AMICUS CURIAE* INDEPENDENT PETROLEUM ASSOCIATION OF MOUNTAIN STATES[1]

IPAMS respectfully submits this *amicus curiae* brief in support of Petitioners, Amoco Production Company, and the class members it represents. Pursuant to Supreme Court Rule 37.2, this *amicus curiae* brief is filed with the written consent of the parties.[2]

INTEREST OF THE *AMICUS CURIAE*

IPAMS is a regional trade association of over 1000 companies and individuals involved in the exploration, development, and production of crude oil and natural gas in the Rocky Mountains and Western United States. Many IPAMS members own oil and gas leases under which natural gas in coal bearing formations is being developed. The ownership of this gas is critically important to IPAMS members, who have relied upon the 1981 Solicitor's Opinion[3] in developing these resources. IPAMS foresees numerous hardships if the Court of Appeals' decision overturning these settled expectations is not reversed.

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[1] This brief is authored solely by counsel for *Amicus Curiae* Independent Petroleum Association of Mountain States ("IPAMS").

[2] Copies of the consent letters were concurrently filed with the Clerk of the Court.

[3] *Ownership of and Right to Extract Coalbed Gas in Federal Coal Deposits*, 88 I.D. 538 (1981) ("Solicitor's Opinion").

SUMMARY OF ARGUMENT

The Court's reading of the reservation of "coal" under the Coal Lands Acts of 1909 and 1910, 30 U.S.C. §§ 81, 83-85 ("the Acts"), will determine the ownership of natural gas in coal formations underlying 20 million acres of now-private land. This decision will affect the property rights of countless citizens who are not included in the class certified here, all of whom relied upon the Solicitor's Opinion. The construction given by this Court must harmonize with the Acts' purposes, the land classification system referenced in the Acts, and the uses Congress intended to preserve and convey under the Acts. Each of these demonstrate that Congress reserved to the public domain all hard rock coal of a sufficient minimum value, not coalbed gas. The inherent nature of gas, whether still in the coalbed or migrated to surrounding formations remains the same. It is gas and not coal. The plain and common meaning of the word "coal" does not include gas. In its decision overturning the ownership of gas in coal formations, the Court of Appeals ignored these facts and fashioned instead an artificial and strained interpretation that must be reversed.

I. AT STAKE HERE IS THE OWNERSHIP OF NATURAL GAS UNDERLYING 20 MILLION ACRES OF LAND.

This lawsuit affects countless parties beyond the class members identified with interests under the Southern Ute Indian Reservation. Private landowners, oil and gas lessees, royalty owners, and state and local governments across sixteen million acres of land, in seventeen

states, stand to lose their rights to natural gas in coal beds. Ownership of rights to coalbed gas is also at issue for another 4 million acres of land in which the government reserved only oil and gas under the 1914 Act. 30 U.S.C. § 121. Producers have relied upon the past ownership scheme to develop these gas reserves in areas such as the Raton Basin of Colorado, the Uintah Basin of Utah and the Powder River Basin of Wyoming. By providing tax incentives for producing gas in coal beds and other tight formations,[4] as well as issuing the Solicitor's Opinion regarding ownership of the gas, Congress encouraged producers to develop these gas reserves, which may now be taken away. If this Court ratifies the newly fashioned scheme, the prior equitable rights of these parties will be litigated against the federal government again and again.

The best evidence of Congressional intent is the interpretation given the Acts by the U.S. Department of the Interior ("Interior Department") in its 1981 Solicitor's Opinion. In reliance upon the Opinion concluding that gas in coal formations was not reserved to the United States under the Acts, thousands of coalbed gas wells have been drilled over the last 18 years. To independent producers, the federal government's recent abandonment of its longstanding Solicitor's Opinion, in order to seize the rights to coalbed gas, is unconscionable and frightening. If the new ownership regime is upheld, producers must separately lease coalbed gas under a whole new chain of title in order to acquire marketable title to this gas. In many instances they may have to produce gas in coal beds separate from gas in surrounding formations.

---

[4] Section 29, Internal Revenue Code, 26 U.S.C. § 29.

That results in economic hardship, more expensive recovery processes and waste of natural gas.

Ultimately, however, this new title interpretation is most unfair to the countless heirs of those homesteaders who received patents under the Acts. These citizens are permanently disenfranchised from their property in favor of their sovereign. Ironically, the Acts were intended, in part, to alleviate the suffering and inequities created by the federal government's withdrawal of lands classified as valuable for coal, after the homesteading process had begun. *See* 1909 Act, 30 U.S.C. § 81; 43 Cong. Rec. H2503 (February 16, 1909). All of these adverse consequences are unjustified when a careful look at the meaning of the reservation of "coal" in the Acts is undertaken.

II. THE CONSTRUCTION GIVEN BY THE COURT MUST HARMONIZE WITH THE ACTS' INTENDED PURPOSES, THE LAND CLASSIFICATION SYSTEM AND THE USES CONGRESS INTENDED TO PRESERVE AND CONVEY UNDER THE ACTS, ALL OF WHICH DEMONSTRATE THAT NATURAL GAS WAS NOT INCLUDED IN THE RESERVATION OF COAL.

Much has been written about the historical framework in which the Acts were passed. *See, e.g., Watt v. Western Nuclear, Inc.*, 462 U.S. 36, 47-50 (1983); *The Classification of the Public Lands*, U.S. Dept. Of Interior, U.S.G.S., Bulletin 537 (1913) ("Bulletin 537"); *see also* Brief of *Amici Curiae* the Coal Bed Methane Ad Hoc Committee *et al.* in Support of Petition, pp. 8-16. At that time, the federal government had implemented a classification system for public lands in which land was reviewed and classified

according to its mineral content. *Id.* The criteria for lands to be classified as "coal lands" was set forth in regulations of the Interior Department. *See Classification and Valuation of Coal Lands*, 37 Pub. Lands Dec. 653 (1909).

A. In Order to Achieve Its Objectives, Congress Made A Narrow Reservation of Only Coal.

When passing the Acts, Congress had two objectives: (1) to encourage the continued development of the West by homesteading; and (2) at the same time to preserve ownership of coal, the nations' primary energy source. *See, e.g.*, 45 Cong. Rec. H6042 (May 10, 1910). In order to accomplish these purposes, Congress deliberately made the mineral reservation narrow. It considered and rejected any number of broader proposals to include in the reservation minerals and "associated minerals," other than coal. For example, during debate over the passage of the 1910 Act, Congress considered, but did not adopt, the following proposed language:

> That all patents for land in the continental United States and the District of Alaska hereafter taken up under any of the public land laws of the United States shall contain an express reservation from the lands in said patent described, to the United States and its lessees of *all deposits of phosphate, oil, asphaltum, natural gas, coal, lignite, or associated minerals therein* and of the right to the use and occupation of so much of the surface of the land so patented as may be necessary to the mining, removal, and sale of said minerals.

45 Cong. Rec. H6162 (May 12, 1910) (emphasis added). Congress also considered, but rejected, the alternative of reserving natural gas:

> Mr. STEPHENS of Texas. Why is it necessary to preserve and reserve to the Government the coal and not at the same time reserve to the Government other fuels, such as gas and oil?
>
> Mr. MONDELL. Well, the gentleman has wandered off into a very large field, and there are a great many answers to that. One is, and the answer that really controls here, that coal crops out and comes to the surface, and its presence is therefore apparent. That coal extends under considerable areas of land is matter beyond all dispute and controversy. Geological horizons, running unbroken through large areas of territory carry with them unbroken, undiminished coal veins, so that is not difficult to determine approximately the probable extent and area of coal lands.
>
> Mr. STEPHENS of Texas. Is not the gentleman aware that oil is the same thing?
>
> Mr. MONDELL. Oil is found here and there. It is wherever you find it. Gas is found here and there. Oil and gas present much greater difficulties, when we propose to separate the surface from the mineral, than coal. I question whether we should provide for surface entries of such lands.

45 Cong. Rec. H6044 (May 10, 1910).

Instead, Congress accomplished its objectives by limiting the scope of the Acts to coal. And it tied the reservation of "all coal in said lands" to only those lands

classified as coal lands under Interior Department criteria. Thus the 1909 Act concerns those lands "classified . . . as being valuable for coal." 1909 Act, 30 U.S.C. § 81. Similarly, the 1910 Act concerns lands "which have been classified as coal lands." 1910 Act, 30 U.S.C. § 83. In some cases the lands had not yet been classified by the Interior Department. If they were subsequently "claimed or reported" as valuable for coal, or had been withdrawn pending classification, the lands were also subject to the Acts. *Id.* However, a homestead entryman could challenge the claim or even the land's classification as coal land, "with a view of disproving such classification and securing a patent without reservation." *Id.* at § 85. In such proceedings, the criteria set forth in the Interior Department regulations were applied to determine whether the claim or classification was valid. Bulletin 537, p. 65. If validated, homestead patents that issued for these lands would contain the reservation to the United States of the coal. *See, e.g.*, 45 Cong. Rec. H6041 (May 10, 1910). Since the classification system and the classification criteria formed the basis for the mineral reservation, a harmonious reading of the Acts requires that the meaning of "coal" as reserved thereunder be consistent with the meaning of "coal" set forth in those criteria.

B. The Land Classification Criteria Show That Coal Did Not Include Gas.

Neither the land classifications themselves, nor the regulations, support the interpretation that natural gas was included in the reservation of coal in the Acts. Under

the classification system, there were separate land classifications for (i) coal; (ii) oil and gas; (iii) phosphate; (iv) potash; (v) metalliferous minerals; and (vi) water resources. Natural gas was uniformly treated separately and apart from coal. In fact, it was classified only in tandem with oil. The Interior Department also recognized that oil and gas had markedly different physical qualities from coal. For example, contrary to coal, gas (and oil) were known as mobil substances capable of "migrating through varying thicknesses of pervious strata to their present places of accumulation." Bulletin 537, p. 112. Because of their migratory mobility, gas and oil required "variations from the type of procedure employed in classifying lands containing coal, phosphate or other stable minerals." *Id.* p. 7. As mentioned above, these differences were also recognized by Congress when the Acts were debated. *See supra* p. 6.

Similarly, the regulations do not support the position that natural gas was included with the meaning of "coal" reserved under the Acts. The regulations provided that all coal deposits be divided into four classes, all of which were solids: (A) Anthracite, semianthracite, coking and blacksmith coals; (B) high grade bituminous coking coals; (C) bituminous coals; and (D) low grade bituminous coals. 37 Pub. Lands Dec. at 653. Lands were given the classification "coal lands" only upon meeting minimum thickness and other criteria, none of which related to gas. For example, lands with class C coals "of any thickness at depths greater than 2000 feet *are noncoal lands, except* where the rocks are practically horizontal and the coal lies within two miles of the outcrop or point at which it can be reached by a 2000 foot shaft." *Id.* at 653-54.

(emphasis added). The coal was "valued" on the basis of the estimated recoverable tonnage, and a price per ton, taking into account accessibility and transportation to market factors. *Id.* Only where the coal met the threshold criteria was the land classified as coal land and made subject to a patent reservation of coal pursuant to the Acts. *Id.*

Consequently, not all coal was reserved by Congress pursuant to the Acts. The Court of Appeals misconstrued this point and found it persuasive that "Congress chose to reserve *all* the coal." Petitioner's Appendix ("Pet. App.") p. 29a (emphasis added). Likewise, the classification criteria contradicts the conclusion by the Court of Appeals that Congress intended to reserve all possible present and future value of the coal. Coals which were not considered valuable at that time were excluded from the reservation. Only lands with coal deposits meeting the minimum valuation criteria were subject to the reservation under the Acts. Significantly, under the classification system, the coal's value was determined solely from its hard rock fuel content, without any mention of gas. Nowhere was coalbed gas (then known as marsh gas) mentioned, valued, or giving any bearing on the land's classification as "coal land". Use of the classification system establishes the Congressional intent that portions of the coal resource not considered valuable at that time, as well as substances intermingled with the coal, such as ground water and natural gas, were not included in the reservation under the Acts.

C. The Appellate Court's Analysis Is Inconsistent With The Uses Reserved and Conveyed Under the Acts.

In its opinion the Tenth Circuit neither mentions the government's land classification system nor reconciles it with the purposes of the Acts. Those purposes are tantamount in determining the Acts' scope. *Dole v. United Steelworkers*, 494 U.S. 26, 35 (1990). Stated another way, in construing a land grant statute, the Court should give weight to the purpose of the reservation (and the purpose of the grant) that was being made. *Western Nuclear*, 462 U.S. at 47. Here the purpose of the reservation was to keep coal that was of a certain minimum value in public control. The purpose of the grant was to encourage homesteading of western lands. The classification system shows that coal, the black solid rock fuel, was being reserved. The homesteader was granted the surface of the lands and *all* other minerals, including oil and gas. Since oil and gas were conveyed without qualification, it is infinitely more logical to conclude that the homesteader received the natural gas in all formations, not that gas in coal seams was silently, or by implication, reserved to the United States.

Where a dispute exists as to whether a particular mineral resource is included in a reservation, it is also helpful to consider "the manner in which the material is extracted and used." *Western Nuclear*, 462 U.S. at 52. Here, coal and the right to "prospect for, mine, and remove the same" was reserved to the federal government. In contrast, the oil and gas were conveyed to the homesteader and along with it the rights to drill wells for recovery of same. In 1909 it was commonly known that natural gas

was recoverable by well drilling processes, not surface or underground mining. *See, e.g.*, Bulletin 537, p. 111. It strains credibility, therefore, to construe the Acts as providing coal miners the concomitant right to drill wells for natural gas in coalbeds, when their expertise lies elsewhere and no such uses were reserved under the Acts. *Western Nuclear* at 56. One does not "mine" for natural gas.

III. DISTINGUISHING OWNERSHIP OF NATURAL GAS IN COAL ROCKS FROM NATURAL GAS THAT HAS MIGRATED OR IS LOCATED IN SOURCE ROCKS OTHER THAN COAL IS UNSOUND AND IMPRACTICAL.

Contrary to the Court of Appeal's findings of the "unique nature of the CBM," natural gas in coalbeds is like any other natural gas. Natural gas is defined as:

> A naturally occurring mixture of hydrocarbon and nonhydrocarbon gases found in subsurface reservoirs within the Earth's crust. Methane (CH_4), a light hydrocarbon, is the primary constituent of natural gas and of principal interest to the energy industry.

See, e.g., U.S. Office of Technology Assessment, U.S. Natural Gas Availability, § 3, "Natural Gas Basics," 21 (1983); *accord* Norman J. Hyne, *Finding and Producing Oil and Gas*, 19-20 (Energy Textbooks Int'l 1985); A Primer of Oilwell Drilling, 89 (U. of Texas at Austin, 3d ed. 1978). Like other forms of natural gas produced for fuel, gas in coal seams contains these same hydrocarbons and is, in fact, primarily methane. *See, e.g.*, Potential Gas Committee, Colorado School of Mines, *Potential Supply of Natural Gas*

in the United States, "Natural Gas Resources in Coalbeds," p. 10 (March 1997) ("Potential Gas Report"). Likewise, gas from coal formations must be recovered by oil and gas drilling techniques and, once produced, is combined in the same pipelines with other gas and delivered to households and businesses.

Furthermore, as already discussed, Congress and the Interior Department recognized in 1909 that coalbed gas, like any other natural gas, is migratory in nature. In many areas the gas which presently exists in the surrounding strata originated in nearby coal seams. Over geological time, the gas migrated out of the coal and into other formations, such as sandstones and shale. Potential Gas Report, p. 11. There was no chemical transformation that accompanied the migration. *Id*. When the gas was in the coal it was gas, not coal, and when it migrated elsewhere it was still gas.

No logical basis has been established for defining the gas before migration as coal. Even the Tribe and the Tenth Circuit concede that once the gas migrates from the coalbed, it is like all other gases and belongs to the owner of the gas estate. Given this reality, it is error to conclude that while the gas exists in the coalbed, it is not "gas" but "coal" and therefore belongs to the owner of the coal estate. This artificial distinction creates enormous operational difficulties. In some places, due to deposition of sediments millions of years ago, sandstone and coal are interbedded and production from a zone will invariably include gas from both the sandstone and the coal reservoirs. In addition to the expense of "double leasing" for marketable title to the gas from both the oil and gas and coal owner, as a practical matter, it may be difficult or

impossible to determine if the gas is being produced from one source or the other.[5]

The Court of Appeal's attempt to use scientific anaylsis to construe the Acts is also flawed. It found that since the gas before migration was "trapped" or "adsorbed" to the coal, it was silly to suggest Congress would have intended to consider the gas separate and apart from the coal. However, it is doubtful that the 1909 Congress utilized such scientific analysis or considered whether other minerals were adsorbed to the coal. *See, e.g., Barber v. Gonzales*, 347 U.S. 637, 643 (1954) (technical reading appropriate only where statute indicates technical meaning was intended). Moreover, the fact that the gas and coal were adsorbed to one another does not change their separate natures.[6] In addition to coal, natural gas may be adsorbed to sandstones, shales or other source rocks. *See, e.g.*, Watson, A.T. *Adsorption Measurements in Devonian Shales*, Paper. No. SCA-9302, Society of Core Analysts Technology Conference, Texas A&M Univ. (1993). This adsorption is merely the way gas is stored in

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[5] *See, e.g., In re Application of Pendragon Energy Partners Inc. and J.K. Edwards Assoc. Inc. To Confirm Production from the Appropriate Common Source of Supply, San Juan County, New Mexico*, State of New Mexico, Energy, Minerals and Natural Resources Dept., Oil Conservation Division, Case No. 11996, Order No. R-11133 (February 5, 1999).

[6] Under Dept. of Interior definitions, "Adsorbed" means "to condense and to hold a gas on the surface of a solid, particularly metals". Similarly, "Adsorption" means "a taking up by physical or chemical forces of the molecules of gases, of dissolved substances or of liquids by the surfaces of solids or liquids with which they make contact." *A Dictionary of Mining, Mineral and Related Terms*, Dept. of Interior 1968).

that particular reservoir. The gas is not in those circumstances considered a mere constituent of that rock. Rather, it remains natural gas. To accept the Tenth Circuit's view, however, one must adopt the belief that in this particular instance, "gas" is merely a subset of "coal" and that in 1909 and 1910 Congress intended to adopt an incorrect scientific analysis not evidenced anywhere in the legislative history.

IV. THE PLAIN AND COMMON MEANING OF "COAL" SHOULD BE DETERMINATIVE.

The Appellate Court's strained analysis is unpersuasive because at the time Congress reserved the coal from the homesteaders' patents almost ninety years ago, the common man undoubtedly considered coal to mean the black, solid rock fuel used for heating and energy purposes. *See, e.g., Addison v. Holly Hill Fruit Products*, 322 U.S. 607, 618 (1944) ("legislation when not expressed in technical terms is addressed to the common run of men and is therefore to be understood according to the sense of the thing, as the ordinary man has a right to rely on ordinary words addressed to him.") The common man was unlikely to consider (if he even thought about it), that marsh gas known to be a dangerous substance coexisting with coal, was a part of the coal.

It is the most basic tenet of statutory construction that the plain and common meaning of terms should control unless at odds with the statute when read as a whole. *See, e.g., United States v. Alvarez-Sanchez*, 511 U.S. 350, 357 (1994); *Smith v. United States*, 508 U.S. 223, 228 (1993); *Gustafson v. Alloyd Co. Inc.*, 513 U.S. 561, 570 (1995)

("This rule we rely upon to avoid ascribing to one word a meaning so broad that it is inconsistent with its accompanying words.") Coal in 1909 (and still in 1999), commonly meant "a black or brownish black solid combustible mineral substance". *See, e.g.,* District Court Opinion, Pet. App. pp. 110a-116a, (setting forth numerous definitions of coal as the solid rock fuel from this period). That same meaning was used to define coal in the classification system upon which the Acts were based. Given this overwhelming evidence of Congress' intent, little persuasive basis exists for the Tenth Circuit's ruling that the term "coal" is ambiguous as used in the Acts and therefore should be construed in favor of the sovereign. *Leo Sheep Co. v. United States*, 440 U.S. 668, 682-83 (1979).

CONCLUSION

For the foregoing reasons, IPAMS respectfully requests that the Supreme Court reverse the Tenth Circuit's ruling and find that natural gas in coal formations was not reserved under the 1909 and 1910 Acts.

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(15)

Supreme Court, U.S.
FILED
MAR 4 1999
CLERK

No. 98-830

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BRIEF OF AMICI CURIAE CAMPBELL COUNTY, WYOMING IN SUPPORT OF PETITIONERS AMOCO PRODUCTION COMPANY, ET AL.

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INTRODUCTION

Campbell County, Wyoming, a governmental entity, by and through the undersigned Counsel files this amicus curiae brief in support of the defendant class' appeal filed by Amoco Production Company.[1] The Tenth Circuit's holding in *Southern Ute Indian Tribe v. Amoco Production Company*, 151 F.3d 1251 (10th Cir. 1998), is of grave concern to Campbell County, Wyoming because it changes ownership rights in approximately 400,000 acres of land in the county which are owned by residents of the county. Failure to reverse the decision of the Tenth circuit holding that the United States reserved coalbed methane, as well as coal in the 1909 and 1910 Coal Lands Acts, will have a devastating economic impact on the local institutions and on the individual residents of Campbell County, Wyoming. Campbell County, Wyoming therefore respectfully requests that the United States Supreme Court reverse the Tenth Circuit's decision regarding the ownership of coalbed methane.

INTEREST OF AMICUS CURIAE

Campbell County, Wyoming is located in the center of the Powder River Basin in northeastern Wyoming and borders Montana. Gillette is the county seat and largest town in the county. Mineral development has been, and

[1] Campbell County, Wyoming is a county and files this brief pursuant to Rule 37.4 of the Rules of the Supreme Court of the United States. None of the parties authored this brief. The brief was authored by counsel of record.

is, of vital importance to Campbell County. According to the BLM records, there are approximately 400,000 acres in Campbell County patented under the 1909 and 1910 Coal Lands Acts and approximately 1.4 million acres in Campbell, Sheridan and Johnson Counties.[2] Campbell County is located in the coal and petroleum rich Powder River Basin. A large portion of the economic activity in Campbell County involves natural resources development. Wyoming is the largest coal producing state in the United States and Campbell County is the largest coal producing county in Wyoming. Because the Powder River Basin in Campbell County is a mature basin for oil and gas exploration, coalbed methane exploration and development is vital to the future of the local economy.

The decision of the Tenth Circuit is of extraordinary concern to the county because in one decision, the Tenth Circuit changed ownership rights in coalbed methane gas in 400,000 acres of land in Campbell County alone. The Tenth Circuit ruled that coalbed gas "was reserved to the United States" when Congress reserved "coal" under the 1909 and 1910 Acts.[3] This ruling is not confined to the coal owned by the Southern Ute Indian Tribe; followed to its logical conclusion, the decision affects the ownership of

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[2] Information regarding the amount of acreage obtained from the Buffalo, Wyoming Resource Office of the BLM. Campbell, Sheridan and Johnson Counties comprise most of the Powder River Basin in which coalbed methane production exists and is anticipated in the future.

[3] Act of March 3, 1909, 35 Stat. 844 (30 U.S.C. § 81) ("the 1909 Act"); Act of June 22, 1910, 36 Stat. 583 (30 U.S.C. § 85) ("The 1910 Act"), (collectively known as the "Acts" or "Coal Lands Acts").

coalbed gas in 16 million acres of land patented under the 1909 and 1910 Acts across the West.[4] According to the decision, mineral owners who own all oil and gas in lands as successors-in-interest to the patentees under the 1909 and 1910 Coal Lands Acts do not own the coalbed gas.

For over eighty years, the patentees and their successors have conducted business believing gas was gas and not included as part of the coal. Because of Public Law 105-367, the mineral owners who were fortunate enough to have obtained production or executed leases, prior to October 21, 1998, have some relief. However, for those who do not have production, but have executed a lease, the protection expires when the lease expires under the current state of the law. Mineral owners who were not fortunate to have their lands under lease on October 21, 1998, lost their rights to any coalbed methane production.

If the Supreme Court does not reverse the Tenth Circuit Court of Appeals decision, the residents of Campbell County will be stunned by the taking of their mineral interests by the Federal Government without notice and without compensation.

SUMMARY OF THE ARGUMENT

The plain meaning of the terms of the Acts should be used in determining the intention of Congress when it enacted the Coal Lands Acts of 1909 and 1910. The meaning of "coal" in 1909 and 1910 is the same as it is now, a

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[4] U.S. Dept. of Interior, Bureau of Land Management, Public Land Statistics, 1993, p. 16.

solid black substance to be recovered as a solid and not a gas. Coal was reserved by the United States in 1909 and 1910 because coal was valuable to the United States. Coalbed methane was a waste by-product which Congress could not have intended to reserve.

The history of the United States and the West supports the conclusion that Congress did not intend to reserve coalbed methane when it reserved coal under the 1909 and 1910 Coal Lands Acts. The availability and use of the solid coal was significant in establishing the route of the Union Pacific Railroad across southern Wyoming. The mining of the coal provided fuel for the steam engines and freight for the trains. Coalbed methane, on the other hand, caused mine explosions which resulted in the worst coal mining disasters in Wyoming in 1903 and 1908. Congress knew coalbed methane was dangerous, therefore, Congress could not have intended to reserve coalbed methane with the coal in 1909 and 1910.

Campbell County, Wyoming and its residents will suffer economic impact if the Tenth Circuit decision is not reversed. The discovery and development of coalbed methane was undertaken with the understanding that coalbed methane belonged to the patentee and that development should be honored. Any protection offered by Public Law 105-367, 112 Stat. 3313 (1998) will be short-lived upon the expiration of contracts and leases existing as of October 21, 1998.

Campbell County requests that the Supreme Court of the United States reverse the decision of the Tenth Circuit Court of Appeals regarding the ownership of coalbed

methane for lands patented under the 1909 and 1910 Coal Lands Acts.

ARGUMENT

I. CONGRESS COULD NOT AND DID NOT INTEND TO RESERVE COALBED METHANE WHEN IT RESERVED COAL UNDER 1909 AND 1910 COAL LANDS ACTS.

The controlling intent is the intent of the Congress that actually passed a particular statute being interpreted. "[T]he pertinent inquiry in the case is the intent of Congress when it granted land to Union Pacific in 1862". *Leo Sheep Co. v. United States*, 440 U.S. 668, 681 (1979). When looking at the language of the statute, a court must "assume" that congressional intent is reflected by the ordinary meaning of the words used, *United States v. Labonte*, 520 U.S. 751, 177 S.Ct. 1673, 1677 (1997). The Supreme Court has ruled that when Congress does not define a term in a statute, that term is to be construed in accordance with the ordinary meaning. *United States v. Smith*, 508 U.S. 223, 228 (1993).

In statutory interpretation, the court "look[s] to the plain language of the statute and give[s] effect to its meaning", *United States v. Ron Pair Enter., Inc.*, 489 U.S. 235, 241 (1989). "Courts properly assume, absent sufficient indication to the contrary, that Congress intends the words in its enactments to carry 'their ordinary, contemporary, common meaning.' " *Pioneer Inv. Servs. v. Brunswick Assocs.*, 507 U.S. 380, 388 (1993) (quoting *Perrin v. United States*, 444 U.S. 37, 42 (1979)); *accord Consumer*

Products Safety Comm'n v. GTE Sylvania, Inc., 447 U.S. 102, 108 (1980). The "ordinary meaning" of an undefined statutory term is the meaning in existence when Congress enacted the statute. *Perrin*, 444 U.S. at 42.

Applying these principles to the Acts, Congress expressed its intent to reserve "coal" in patents issued under the Acts. Because Congress did not define the word "coal," it must be construed in accord with its "ordinary, contemporary, common meaning" at the time Congress passed the Acts. *Pioneer Invs. Servs.*, 507 U.S. at 388; *Perrin*, 444 U.S. at 42. The ordinary and common meaning of "coal" when Congress passed the Acts was "a black, or brownish black, *solid*, combustible mineral substance." *Webster's New International Dictionary of the English Language* 424 (1916) (emphasis added). Other sources of the day define "coal" as a black or brownish black solid combustible mineral substance. *See also The Century Dictionary and Cyclopedia* 1067 (1906) ("A *solid* and more or less distinctly stratified mineral, varying in color from dark-brown to black, brittle, combustible, and used as a fuel.") (emphasis added); *The Universal Encyclopedic Dictionary* 945 (1905) ("A carbonaceous mineral substance, black, shiny or dull, easily broken, often splintery, inflammable, and used for fuel.").

The popular and common understanding of "coal" as a black or brownish black solid combustible mineral substance has been consistent from the time of the Acts to the present. *See, e.g., The Shorter Oxford English Dictionary* 330 (1936) ("A mineral, *solid*, hard, opaque, black or blackish, found in seams in the earth, and largely used as a fuel.") (emphasis added); *Webster's New International Dictionary* 511 (2d ed. 1958) ("A black, or brownish-black, *solid*, combustible substance formed by the partial decomposition of vegetable matter without free access of air.") (emphasis added); *Webster's Third New International Dictionary* 432 (1986) ("A black or brownish black *solid* combustible mineral substance.") (emphasis added).

Turning to the issue before the Court, Congress' unqualified use of the word "coal" means that Congress reserved the black or brownish black solid combustible mineral substance commonly known as "coal" in patents issued under the Acts. *See Pioneer Invs. Servs.*, 507 U.S. at 388; *Perrin*, 444 U.S. at 42. Coalbed gas is neither black or brownish black nor is it a solid. The word coal thus does not include coalbed gas. No one has identified a definition of "coal" that includes coalbed gas. Coalbed gas instead falls within the ordinary and popular definition of "gas" as "an aeriform fluid, having neither independent shape nor volume, but tending to expand indefinitely." *Webster's New International Dictionary* 892 (1916).

In 1909 and 1910, Congress expressed its intent in unambiguous terms. Patents issued under the Acts reserved to the United States the black or brownish black solid combustible mineral substance commonly known as "coal." Congress conveyed coalbed gas and all other minerals that do not fall within the ordinary and popular meaning of "coal" to the patentees. The word "coal" in the Acts thus unambiguously excludes coalbed gas. That language is conclusive on the issue before the Court. *E.g., Consumer Product Safety Comm'n*, 447 U.S. at 108. Congress did not reserve coalbed methane gas.

II. A REVIEW OF HISTORY OF THE UNITED STATES AND THE WEST CLEARLY INDICATES THAT CONGRESS COULD NOT HAVE INTENDED TO RESERVE COALBED METHANE IN 1909 AND 1910. CURRENT TREATMENT OF COALBED METHANE CONFIRMS THE HISTORICAL INTENTIONS.

In 1909 and 1910, the United States reserved coal because it was a necessary and useful source of energy for the development of the country. American History texts and sourcebooks taught in our public schools emphasize that coal and steel were the foundations of American Industry. In discussing the growth in the United States following the civil war, a Smithsonian historian wrote, "Coal deposits provided fuel for steam engines and furnaces of the iron industry", Herman J. Viola, *Why We Remember, United States History, Civil War to the Present*, at page 262. Another historian wrote for our school children, "the industrial age would not have been possible without abundant deposits of coal and iron which could be turned into steel". Gerald A. Danzer, et al., *The Americans*, at page 411. In the chapter discussing "The Rise of Industry", the authors stated "large deposits of coal fueled the nations steel mills". James West Davidson, Michael B. Stoff, *American Nation*, at page 543. Congress clearly considered the nation's best interests when it decided in 1909 and 1910 to reserve the solid coal that was critical to the economic development of the nation at the beginning of this century.

At the time the Coal Lands Acts were enacted, the solid coal was a valuable resource to the country and to Wyoming in particular. Coal was produced in Wyoming

before the Wyoming territory was established in 1869. The easy access to coal reserves heavily influenced the Union Pacific decision in the 1860's to build its railroad through Wyoming. Roy A. Jordan and S. Scott DeBoer, *Wyoming a source book* at page 169, T.A. Larson, *Wyoming, a History*, at 144. The solid coal was valuable and consequently Congress reserved the coal when passing the 1909 and 1910 Acts.

Coalbed methane gas, on the other hand, was neither useful nor desired when the United States reserved coal. Many Wyoming underground coal mines in the nineteenth century had fires burning "out of control" in them for years. Most of these fires were ignited by spontaneous combustion of gas that had collected in the mines. Jordan, et al., *supra at* page 198. In two separate explosions, one on June 30, 1903 and one on March 28, 1908, a total of 228 miners died in Hanna Mine #1 in southern Wyoming. The 1903 explosion was the worst mine disaster in Wyoming's history. Jordan, et al., *supra at* page 167. Because of the hazards of the methane in the coal in Wyoming at the time the Coal Lands Acts were enacted, as evidenced by the two accidents, Congress would not have intended to reserve the coalbed methane when it reserved coal in 1909 and 1910. Congress could not have intended to reserve a harmful by-product when it reserved the valuable coal in 1909 and 1910. Taken from another perspective, Congress clearly knew that coalbed methane existed because of these disasters, yet, they did not specifically express an intention to reserve the coalbed methane gas. Because Congress knew the existence of coalbed methane gas and did not mention it in the reservation, Congress clearly did not intend to reserve the coalbed methane gas.

For as long as there has been mineral activity in the Powder River Basin, all mineral owners, including owners of coal rights, have transacted business using the clear and obvious definitions set forth above. Simply put, coal is coal and gas is gas and the coalbed gas industry has developed in Campbell County and elsewhere on the basis of this distinction. As a gas, coalbed gas has always been widely viewed as a part of the oil and gas estate that may be leased by the gas estate owner in a standard oil and gas lease. The Wyoming Oil and Gas Conservation Commission (WOGCC), the administrative agency which regulates oil and gas exploration in Wyoming,[5] issues permits to drill for coalbed methane wells. The WOGCC has held hearings regarding the best spacing density for the development of coalbed methane wells. The mineral owners, the coalbed producers as well as the administrative agency, treat coalbed methane as a natural gas belonging to the patentee, and not part of the coal owned by the United States.[6] Coalbed gas has not been treated in Campbell County as part of the coal estate because by definition it is not coal; nor, have coal owners purported to lease the right to develop coalbed gas in coal leases. This practice fits with the reality of coalbed gas development: it is drilled for, produced, and transported to market in pipelines just like any other gas. From wellhead to burnertip, coalbed gas is gas.

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[5] *See* Wyoming Stat. § 30-5-101 et seq. (1977).

[6] *See* Wyoming Oil and Gas Conservation Commission Website – http//www.wogcc.state.wy.us.

III. MINERAL OWNERS AND OIL AND GAS EXPLORATION COMPANIES HAVE RELIED UPON THE HISTORICAL TREATMENT THAT COALBED METHANE IS GAS AND THEREFOKE IS INCLUDED IN THE GRANT TO THE PATENTEES.

Campbell County's coalbed gas resources are enormous. Over the last six years, coalbed gas leasing, exploration, drilling, and production in Campbell County has grown from virtually nothing into a major economic activity. The activity has been undertaken under the belief that coalbed methane gas belonged to the patentee or its successors under the 1909 and 1910 Coal Lands Acts. Coalbed methane development is the most active exploration activity currently underway in Campbell County. For example, between July 1996 and June 1997, when all parties were operating under the commonly held belief, 672 applications for permits to drill coalbed gas wells were filed for drilling on federal, private, and state lands in Campbell County.[7] [8] During this same period, Campbell County ranked as the top county in the Rocky Mountain Region for coalbed gas permitting and drilling activities.

Approximately 400,000 acres of land in Campbell County were patented under the 1909 and 1910 Acts construed by the court in the Tenth Circuit decision. The mineral owners in Campbell County are ordinary people

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[7] *See* Wyoming Oil and Gas Conservation Commission Website – http//www.wogcc.state.wy.us.

[8] *Southern Ute Indian Tribe v. Amoco Production Co.*, 119 F.3d 816 (10th Cir. 1997). This decision was issued in July 1997.

and make up a diverse group – ranchers, working people, public employees, large landowners, small landowners, widows, and retired people. Many mineral owners are descendants of the original patentees. Because Congress reserved only the solid mineral coal under the 1909 and 1910 Acts and conveyed all other minerals to the patentees, Campbell County landowners who own lands patented under the 1909 and 1910 Acts own all oil, gas and other minerals, except coal in their lands.

From the beginning of the coalbed gas exploration and development boom in Campbell County, everyone – petroleum companies, mineral owners, landowners, coal mining companies, and the state and federal governments – has treated coalbed gas as owned by the oil and gas estate owner. The original development of coalbed methane occurred because of oil and gas leases from mineral owners who received their interest under the 1909 and 1910 Coal Lands Acts. This Court has traditionally recognized the special need for certainty and predictability where land titles are concerned. *Leo Sheep Co.* at 688. The entire coalbed gas industry rests on the basic foundation that coalbed methane is a part of the oil and gas estate and naturally passed on to the patentees. Until the Tenth Circuit decision, Campbell County residents relied upon this basic understanding of property law. The growth of the coalbed gas industry has greatly affected and impacted Campbell County mineral owners who own the oil and gas estate in their lands, including those who own some of the 400,000 acres patented under the 1909 and 1910 Acts.

Campbell County and its residents see the resolution of this issue as straightforward and uncomplicated. Wyoming mines more coal than any other state, producing 20% of the nations total coal output. In 1993, Campbell County mines produced 181.9 million tons of the 209.9 million tons mined in Wyoming. Jordan, *supra* at 165. All of the coal mined in Campbell County is mined using open pit surface mines. Virtually all the residents of Campbell County are familiar with coal. Coal is the solid black substance shoveled by a dragline into trucks that haul the coal from the pit to be loaded on to trains which then transport the solid coal to a distant power plant. No one concludes that the black solid substance is a "gas".

IV. THE DECISION WILL HAVE SEVERE ADVERSE IMPACT ON CAMPBELL COUNTY TAX REVENUES.

The adverse impact on the tax revenues of Campbell County resulting from the Tenth Circuit Court of Appeals' decision is enormous.

Mineral owners execute oil and gas leases to exploration companies, granting the right to explore for oil and gas to the exploration companies. The mineral owner reserves a portion of the revenue free of cost in exchange for the right to explore for oil, gas or other minerals. The amount reserved by the mineral owner is commonly referred to as the "royalty" interest. If the mineral rights are owned by the patentee or its successors, the royalty is paid to the fee mineral owners. If the mineral rights are owned by the United States, the federal government receives the royalty payment.

Campbell County receives an ad valorem (property tax) revenue in the amount of 5.97% of the value of production on royalty paid to fee mineral owners.[9] Campbell County does not and cannot receive tax revenue for Ad Valorem Tax on royalties paid to the United States. The tax revenue lost if the royalty payments are made to the United States rather than to the patentees is significant. Assuming 50% of the acreage subject to the 1909 and 1910 Acts is productive, and assuming that 50% of the productive acreage is unleased, there are 100,000 acres still subject to the Southern Ute Indian decision in Campbell County alone. (400,000 x .5 = 200,000; 200,000 x .5 = 100,000). Currently, one well is being drilled on each 40 acre tract in Campbell County, Wyoming. Therefore, there are 2,500 potential drill sites on unleased acreage. The average daily production rate of a coalbed methane ("CBM") well in the Powder River Basin on every 40 acre tract is 200 mcf (200 thousand cubic feet) per well per day.[10] Based upon an examination of the records in the Campbell County Clerk and Recorders Office,[11] the average royalty reserved on leases from fee mineral owners is 15% of the value of the production. The average price for coalbed methane for 1998 has been $1.80/mcf. Therefore, the *Southern Ute* decision will cost Campbell County tax revenue of $2,941,717/year [(200/mcf/day x $1.80 (price/

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[9] *See* portions of the 1998 Wyoming Property Taxation prepared by the Wyoming Taxpayers Association lodged with the Clerk of the United States Supreme Court.

[10] *See* Wyoming Oil and Gas Conservation Commission Website – http//www.wogcc.state.wy.us.

[11] Examination made by counsel of record for Campbell County, Wyoming.

mcf) x .15 (royalty rate) x .0597 (tax rate) x 365 (days per year) x 2500 (number of wells)].[12]

With oil prices and coal prices falling, production of coalbed methane is necessary to maintain Campbell County's tax revenues. In 1997, 18.22% of Campbell County's tax revenue was from ad valorem taxes on oil and 58.06% of the tax revenue was from ad valorem tax on coal production. The value of these commodities is decreasing and consequently, the tax revenues to the County are decreasing. The valuation on coal decreased $61,464,820 or 6.5% from 1997 to 1998 and the valuation of oil decreased $48,333,619 or 15% from 1997 to 1998. Valuations are based on prior year prices. With current prices declining, next year's valuations will be even lower for oil and coal. In the same time frame, natural gas valuation rose from $29,135,435 in 1997 to $42,761,158 in 1998, an increase of $13,625,723 or 46.7%.[13] Almost all of this increase in natural gas valuations is due to new coalbed methane production. With the value of the other commodities declining, increased tax revenue from coalbed methane development is critical to Campbell County government functions.

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[12] Using the same formula for the approximate 1.4 million acres subject to the decision in Campbell, Sheridan and Johnson County, will cost the counties a combined total of $10,347,750 in lost tax revenue [1,400,000 x 5 = 700,000; 700,000 x .5' 350,000. 350,000 ÷ 40 = 8,750 wells, 200 mcf/day x $1.80 x .15 x .06 x 365 x 8,750 = $10,347,750].

[13] *See* portions of the 1997 and 1998 Wyoming Property Taxation prepared by the Wyoming Taxpayers Association lodged with the Clerk of the United States Supreme Court. All revenue data was obtained from these publications.

In addition to the tax revenue to the Campbell County treasury, the impact of coalbed methane is significant to the residents of Campbell County. The fee mineral owners are receiving royalty checks, revenues that will be spent in the county. If the revenue goes to the federal government, local citizens will not spend it in the local economy, thus creating an additional loss of revenue to Campbell County.

CONCLUSION

Using the plain meaning of the word "coal" as it was used in 1909 and 1910, statutory interpretation clearly indicates that Congress intended not to reserve coalbed methane. Historical analysis of the use of coal and the dangers of coalbed methane confirms the statutory analysis that Congress could not have intended to reserve coalbed methane when reserving coal in 1909 and 1910.

Campbell County, Wyoming respectfully asks that the Supreme Court of the United States hold that Congress reserved only the solid rock fuel commonly known as "coal" under the 1909 and 1910 Coal Lands Acts, but not natural gas in coal formations.

Respectfully submitted,

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(16)

Supreme Court, U.S.
FILED
MAR 4 1999
OFFICE OF THE CLERK

No. 98-830

In The

Supreme Court of the United States

October Term, 1998

AMOCO PRODUCTION COMPANY, ON BEHALF OF ITSELF AND THE CLASS IT REPRESENTS,

Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,

Respondent.

On Writ Of Certiorari To The United States Court Of Appeals For The Tenth Circuit

BRIEF OF *AMICI CURIAE* STATES OF MONTANA, NEW MEXICO, NORTH DAKOTA, UTAH, AND WYOMING IN SUPPORT OF PETITIONERS

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INTERESTS OF AMICI STATES

In the late nineteenth and early twentieth centuries, Congress sought to encourage the exploration and settlement of the western portion of the United States. Congress sought to stimulate westward expansion by providing, as inducements for settlement, patents issuing title to homesteaded lands. Many lands were passed from the federal government to the patent holder without reservation. Many other lands, such as those subject to the 1909 and 1910 Coal Lands Acts, were passed by patents which contained specific reservations to the federal government. For generations, patentees and their successors have relied on the specific language of their patents for rights conveyed and rights reserved by the federal government.

In *Burke v. Southern R. R. Co.*, 234 U.S. 669, 698-99 (1914), this Court held that "[t]here must be some point in time when the character of the land must be finally determined; and for the interest of all concerned, there can be no better point to determine this question than at the time of issuing the patent." Once title passes, it passes free of all unexpressed conditions of subsequent claim to minerals and the grantee acquires a vested right. *Wyoming v. United States*, 255 U.S. 480 (1921). This case deals with an express and specific reservation. If a mineral reservation can be construed so contrary to the ordinary meaning of the word used, to in effect become a reservation of a different mineral by implication, then the character of the land was not finally determined when the patents issued. The defining issue in this case is whether land patents are final, or if, by disregarding a specific reservation, land grants can be perpetually held open to a

"possibility of reverter" to the federal government of any interest the federal government may later find profitable.

The Tenth Circuit's interpretation of the Coal Lands Acts of 1909 and 1910 divests thousands of patentees of their reasonable expectations for 20 million acres of land patented under the Acts, representing at least 128,500 patents. The original patentees, their successors in interest, and entire economies relied upon the certainty and finality of land grants resting on the plain language of the Coal Lands Acts. The Amici States have a compelling interest in the preservation of existing law relating to patents issued by the United States and in the protection of their property interests and those of their citizens against the United States' expansion of reservations through feigned ambiguity. In addition, the Amici States' tax bases and local economies will be adversely affected by the Tenth Circuit decision; their courts and regulators will be asked to draw meaningless distinctions between natural gases originating in the coalbed and gas originating from other sources; and the confusion the decision creates will subject the Amici States and their citizens to ongoing litigation over ownership of produced gas and over compensation for past production.

SUMMARY OF ARGUMENT

Property law rests on the basic rule that if an interest in the property is not specifically reserved, it passes to a purchaser or grantee. *Wyoming v. United States*, 255 U.S. 480 (1921). The Tenth Circuit's disregard for this basic

rule is at the heart of this case. Land grants and reservations must warrant, on their face, the certainty and finality of property conveyances. For ninety years, there was no question, not even with the federal government, that Congress had not reserved gas in the Coal Lands Acts.

The Tenth Circuit ignored the plain and ordinary meaning of the word Congress used in the Coal Land Acts and that the United States used in crafting the language of patent reservations issued pursuant to those Acts. The Tenth Circuit erred when it held that "coal" was ambiguous. The meaning of "coal" could not be more clear. But because coal is porous, and adsorbs coalbed gas, the Tenth Circuit held that coalbed gas is actually part of the coal. 151 F.3d at 1260. In basing its conclusion on the fact that coal gas production in 1909 and 1910 was not considered viable, the Tenth Circuit admitted that Congress was concerned only with reserving coal in the Coal Lands Act. 151 F.3d at 1261, 1263. Congress did not manifest any interest in gas residing in the coal estate, despite the fact that it was aware of the existence of coalbed gas. It did not intend to reserve gas within or outside of the coalbed. If Congress had so intended, it was required, but failed, to make such a reservation express in the Acts and patents.

The Tenth Circuit's decision seeks to erect ambiguity by disregarding the word Congress actually used. The decision requires the assumption that, when Congress used the word "coal" in the Coal Lands Acts, it knew of and intended to reserve the natural gases contained in any reserved coal formation. At the same time, it requires the assumption that, while Congress knew how to expressly reserve coal and other minerals, it somehow

failed to articulate a reservation of gas along with the coal it specifically reserved.

The decision of the Tenth Circuit will be difficult, if not impossible, to apply. Because of the migratory nature of gas, known methods of production cannot prevent coalbed gas and non-coalbed gas from being produced through the same well bore. Moreover, geologists cannot determine with accuracy whether gas found in the coalbed is different from non-coalbed gas. The Tenth Circuit's ruling will only foster disputes about who owns the gas produced. The Tenth Circuit's decision will demand, on a case-by-case basis, ad hoc determinations of who owns what gas, rather than relying on a rule of law that can be applied across the board without litigation. When "gas" is not necessarily "gas," the Tenth Circuit's opinion creates ongoing uncertainty of title. The Amici States ask the Court to restore their citizens and their economies to the certainty and predictability found in the traditional principles of land grants and statutory construction that have long provided the stability necessary to meet America's demand for natural resources.

ARGUMENT

I. PRINCIPLES OF FINALITY AND OF CONSTRUCTION BY PLAIN MEANING THAT FORM THE FOUNDATION OF PROPERTY RIGHTS IN THE UNITED STATES PRECLUDE THE RETROACTIVE MODIFICATION OF LAND GRANTS

(A) Common Sense and the Plain Meaning of the Coal Lands Acts Compel the Conclusion that the Federal Government Did Not Reserve Gas in the Coal Reservation

> Laws are made for men of ordinary understanding, and should, therefore, be construed by ordinary rules of common sense. Their meaning is not to be sought for in metaphysical subtleties, which may make anything mean everything or nothing, at pleasure.[1]

As this quoted passage would indicate, Thomas Jefferson would have had no problem telling the difference between coal and gas. When the metaphysical possibilities of words are taken to their extreme, they lose their value "for men of ordinary understanding." "Coal" refers to a solid, rock-like substance. Coal cannot mean "gas," even when gas is found in a bed of coal. To say otherwise ignores the plain, ordinary meaning of these words.

The Tenth Circuit held that the definition of coal must be determined by unsupported scientific reasoning. For example, it found that gas is part of coal because "the adsorbed component of CBM is molecularly attracted to

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[1] Thomas Jefferson, Letter to William Johnson, June 12, 1823, in *Works of Thomas Jefferson* 7:297 (H.A. Washington ed. 1854).

coal." 151 F.3d at 1260. Under this analysis, the Tenth Circuit has gone to the atomic level to discern whether coal is coal and gas is gas.

This Court has directed that language is to be given a *practical* construction. In *Burke v. Southern Pac. R. R. Co.*, 234 U.S. 669, 679 (1914), this Court was asked to give effect to the strictly scientific view that petroleum is "a resultant of the decomposition of organic matter under certain conditions of temperature and pressure, *and therefore is not a mineral.*" (Emphasis added). Construing a reservation of "mineral lands" contained in the railway land grant act of 1866, this Court rejected a "strictly scientific" definition as "not the test contemplated by the statute." *Id.* Rather than relying on a scientifically based test, the Court prescribed a practical approach in *Burke*, holding that Congress "was dealing with a practical subject in a practical way, and we think it used the words 'mineral lands,' and intended that they should be applied, in their *ordinary and popular* sense." *Id.* (emphasis added). Setting aside the geologic and chemical confusion in the Tenth Circuit's opinion, *Burke* requires that words be given their common meaning so that the dangers Jefferson forewarned so long ago are not realized: that 'meaning is sought for in metaphysical subtleties, which may make anything mean everything or nothing, at pleasure."[2]

If intent is needed at all, the Congressional history of the Acts reveals that Congress intended to reserve only coal. The detailed history of the Coal Lands Acts shows

[2] *Id.*

that Congress was motivated by the "coal famine," which struck at the turn of the twentieth century, driving a serious concern over the price, supply, and control of the country's primary source of energy.[3] Although Congress knew of the existence of coalbed gas,[4] there is no evidence that Congress was concerned about retaining its rights over gas and no evidence that Congress intended to reserve anything more than the vital coal reserves with which it was concerned. There is simply no reason to resort to any rule of interpretation.

The Tenth Circuit invented ambiguity by refusing to give the term "coal" its plain meaning and moved on to the presumption that "ambiguity or uncertainty in the terms employed [in land grants] should be resolved in favor of the government." 151 F.3d at 1257 (*citing Burke v. Southern Pac. R. R. Co.*, 234 U.S. 669, 680 (1914)). Beyond the inescapable recognition that coal as a solid cannot be considered gas, a statute (like a contract) is only ambiguous if it is subject to more than one reasonable interpretation. The failure to reserve a known substance cannot be equated with ambiguity. The simple fact is that Congress did not reserve rights to the coalbed gas. To hold otherwise would be to: (1) rewrite the statutes and patents issued under the statutes; and (2) give the federal government the ability to reopen mineral grants to assert post-transfer claims to unreserved minerals, destroying

[3] *See Hearings on Coal Lands and Coal-Land Laws of the United States Before the House Comm. on Pub. Lands*, 59th Congress 12-13 (1907) (testimony of Edgar E. Clark, Interstate Commerce Commissioner).

[4] 151 F.3d at 1261.

the finality of land grants. As Judge Tacha observed in her dissent to the Tenth Circuit's decision, "the 1909 and 1910 Acts do not mention the Holy Grail, the Hope Diamond, or my left shoe." 151 F.3d at 1269-70. Yet had any of these things been found within a coalbed reserved by the United States, that would hardly mean that they might actually be considered "coal." *Id.*

Under the new paradigm of gas ownership created by the Tenth Circuit, private parties can no longer rely on gas being gas and coal being coal. Parties must now consider whether the gas is characteristic of coalbed gas for which they paid but *cannot* produce, because it has been reacquired by the federal government, or if it is "other gas," which they *can* produce. Then too, they must now ask whether the Tenth Circuit's reasoning will eventually impact other reservations and conveyances that do not distinguish between shale gas, coalbed gas, or gas within oil reserves. If coal does not mean coal, and gas does not mean gas, then every reservation that has long relied on such words of ordinary meaning is open to question.

(B) The Finality of Federal Land Grants

The Tenth Circuit's decision calls into question the validity of land grants made under the Coal Lands Acts by creating the equivalent of a reservation by implication ninety years after the grants were made. This approach departs from the concept of finality as it refuses to recognize that Congress, in retaining rights only to coal, relinquished all other mineral interests to the grantees. As the

Tenth Circuit acknowledged, Congress knew of the existence of coalbed gas at the time of the Acts. 151 F.3d at 1261. If Congress did not know that coalbed gas would later be workable or profitable, this lack of knowledge is irrelevant to the finality of the land grants that Congress made. This Court long ago held that when Congress had knowledge of certain minerals it did not forecast as profitable, failing to expressly reserve them when the patent issued, those minerals passed to the patentee:

> A change in the conditions occurring subsequently to the sale, whereby new discoveries are made, or by means whereof it may become profitable to work the veins as mines, cannot affect the title as it passed at the time of sale. The question must be determined according to the facts in existence at the time of the sale.

Wyoming v. United States, 255 U.S. 489, 498 (1921) (*citing Colorado Coal & Iron v. United States*, 123 U.S. 307, 328 (1887).) Once title passed, it passed free of all unexpressed conditions of subsequent claim to minerals. The grantee acquired a vested right which no subsequent discovery or claim of mineral will divest or disturb. *Wyoming v. United States* at 499. The fact that coalbed gas is now recognized as commercially valuable does not mean that the patentee's title can now be altered or revoked. The Tenth Circuit's reliance on the fact that "CBM was not commercially severable in 1909 and 1910 and thus had no value,"[5] conflicts with the rule of *Wyoming v. United States* that title must be determined at the time of the transfer, not at a subsequent date. The Amici States

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[5] 151 F.3d at 1263.

and their citizens have every right to expect that once Congress decided that it would retain only coal under land grants made pursuant to the Coal Lands Acts, it relinquished all other mineral interests in those lands, including gas. When Congress wanted to reserve all known minerals it did so in 1916; when it wanted to reserve "gas," it did so in the 1914 Act. In the 1909 and 1910 Acts, Congress reserved only coal.

II. GEOLOGICAL PRINCIPLES DEMONSTRATE THAT COALBED GAS IS NOT COAL

(A) Coalbed Gas Is Removed From Coal By Commonly Used Methods

The Tenth Circuit was persuaded that there was enough information in the record about the "unique nature of CBM" to conclude that even if Congress had intended only to retain solid rock coal, "Congress in 1909 *may have* considered CBM to be part of that solid coal." 151 F.3d at 1260 (emphasis added). The court's reasoning rejected the specific reservation of coal in favor of an unarticulated and speculated intent. Turning to its technical analysis, the court asserted that the reserved coal contained coalbed gas in an "occluded" state, which meant that coalbed gas was actually part of the coal. *Id.* The term "occluded," however, describes the porousness of solid coal, which adsorbs the gas, not that coalbed gas is coal.

The same geological processes of bacterial action, burial, compaction, and geothermal heating that produce

oil and natural gas also produce coal.[6] For example, the same process is responsible for the presence of gas found in carbonaceous shales. The Tenth Circuit erroneously believed that this same process is somehow different for coalbed gas. It found that "CBM is generated as part of the chemical and physical processes which convert carbon-rich sediments into solid coal (coalification)." 151 F.3d at 1260. Indeed, the Tenth Circuit's new view of coal is so broad that it removes any distinction between coal and gas. The Tenth Circuit's reasoning would hold that oil, gas, and coal are all the same because they are all carbon-based and are all formed through organic, thermal, and environmental forces. This is the same type of approach that the Court rejected in *Burke*, adopting instead the ordinary and popular use of words.

Because the process that produces coal (coalification) yields a coal rock that is porous, the coal acts as a reservoir for the gas (and water and other gas and liquid),[7] as well as a reservoir for gas migrating from other formations. While the court correctly recognized that the gas can be adsorbed onto the surface of the coal, it incorrectly believed that the gas could not be released without an alteration in the physical state of the coal and could not be released without often causing significant damage to the coal. 151 F.3d at 1260. Therefore, the court concluded that the coalbed gas must be actually part of the coal. The

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[6] B.P. Tissot & D.H. Welte, *Petroleum Formation & Occurrence* 229 (2d ed. 1984).

[7] James E. Fassett, *Coal-Bed Methane – A Contumacious, Free-Spirited Bride; The Geologic Handmaiden of Coal Beds, in Energy Frontiers in the Rockies* 132 (John C. Lorenz *et al.* eds., 1989).

properties of coal and natural gas demonstrate that this conclusion is incorrect.

Like gas contained in tight sands or within oil reserves, the porous structure of coal is simply a storage vehicle for natural gas.[8] In the Powder River Basin of Wyoming, for example, coalbed gas is produced by pumping water from the coalbed, which lifts the pressure on the gas and allows it to rise to the surface naturally. If coalbed gas were part of the solid rock coal, as the Tenth Circuit believed, then such a simple production technique would not be possible. Moreover, if coalbed gas were actually part of the coal, it could not migrate. Yet, like all other natural gas, coalbed gas is mobile. While it may originate in coal seams, it demonstrates no hesitation to migrate to adjacent formations. Indeed, evidence before the district court and the Tenth Circuit demonstrated that coalbed gas frequently migrates many kilometers. World renowned gas deposits, such as those in the North Sea, originated from coal and migrated to non-coal formations.[9]

The Tenth Circuit's opinion looks to the location of the gas and seeks to draw distinctions between kinds of natural gas rather than relying on the established principle that gas is gas. The Tenth Circuit has departed from the age old rule of capture, adopting a new law of origin. Specifically, the Tenth Circuit seeks to differentiate between gas that finds its origin in coal and gas having a

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[8] *Id.*

[9] Appellant's Appendix, Tenth Circuit Court of Appeals, Vol. 8, pp. 1714, 1716.

non-coal origin. Science is unable to tell which of the many organic, thermal, and environmental factors acting upon carbon based sediments over millions of years are responsible for creating the gas found in the coalbed, or for that matter, whether the gas found in the coalbed is even of a coal origin.

While the Tenth Circuit's decision suggests that gas found in the coalbed would initially be treated as "coal," once it is no longer adsorbed by the solid coal, it appears that the coalbed gas would change from "coal" to "gas" under the court's rationale. Prior to the Tenth Circuit's decision, segregation of natural gases according to their origin was not only impractical, but unnecessary since the natural gas owner's rights extended to all gas produced on his lands, regardless of origin. Although such segregation remains impractical, if not impossible, it will be necessary if the Tenth Circuit's decision stands.

To further complicate this matter, the Amici States contain a mixed or "checkerboard" land ownership pattern for both surface and subsurface lands owned by the federal government, states, railroad companies or their successors in interest, ranchers, and mineral companies. Since land ownership is so fragmented, any effect on the lands subject to the Coal Lands Acts will also affect adjoining undisputed lands. Because of the migration of coalbed gas, entire natural gas production fields could be affected by the Tenth Circuit's decision even if individual well bores are drilled on undisputed lands.

(B) Coalbed Gas Is Removed From Coal With No Damage To Or Destruction Of Coal

The Tenth Circuit's view that gas is part of coal was also based on the court's belief that "the adsorbed component of CBM is molecularly attracted to coal and cannot be released without an alteration in the physical state of the coal." 151 F.3d at 1260. Although this is incorrect, the court sought to bolster the claim by asserting that "release of either adsorbed or fracture-trapped CBM requires production techniques which often cause significant damage to the coal." *Id.* In fact, the Court found that "[a]dsorbed CBM, which comprises most of the 'gas' within coal, can be economically produced only by techniques which artificially induce changes in the coal reservoir." *Id.* at n. 10. Again, the Tenth Circuit is incorrect.

For decades operators have drilled degassing wells to vent coalbed gas without destruction of the coal deposits. The method used to produce coalbed gas from the Powder River Basin in Wyoming dispels the Tenth Circuit's notion that production of coalbed gas artificially induces changes in the coal reservoir. In the Powder River Basin, coalbed gas is located 300 to 600 feet from the surface. Gas rises to the surface when operators pump water from the formation, leaving the coal unharmed and available to the owner of the coal estate for subsequent extraction by mining. A simple technology is used to produce the coalbed gas without altering or destroying the coal formation.

III. THE SOCIAL AND ECONOMIC IMPACTS OF THE TENTH CIRCUIT'S DECISION WILL DISRUPT ECONOMIES ESTABLISHED IN RELIANCE ON THE LAND GRANT LAW

The Tenth Circuit's decision has a direct bearing on the stability of the local economies of the Amici States. The Amici States are mineral dependent states. Part of the natural gas production from the Amici States is coalbed gas. The mineral owners and gas producers in the Amici States have relied on the 1981 Department of Interior Solicitor's opinion, which concluded that the United States (i) did *not* reserve coalbed gas when it reserved "coal" under the 1909 and 1910 Acts, (ii) *did* reserve coalbed gas when it reserved "oil and gas" under the 1914 Act, and (iii) would regulate coalbed gas under gas, not coal, regulatory authority.[10] Curiously, the federal Respondents withdrew the 1981 Solicitor's opinion on the same day they filed their brief in this action opposing certiorari, noting in their brief that the opinion had been withdrawn.

(A) School Funding and Tax Revenues

The Amici States receive severance taxes on coalbed gas production, a portion of which is returned to local

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[10] *See Ownership of And Right to Extract Coalbed Gas in Federal Coal Deposits*, 88 Interior Dec. 538 (1981). To address energy supply issues arising from the Arab Oil Embargo, the federal government took steps to encourage development of domestic energy sources. It led efforts to convert coalbed gas from what was universally regarded as a hazard to the important natural gas resource it is today.

governments. The decline in production occasioned by the uncertainty over coalbed gas ownership will result in a loss of revenue to the Amici States and their local governments. The Amici States are sustained by minerals and the disruption of the tax revenues from coalbed gas production could be harmful to local governments within these states.

The Amici States are also mineral owners, in their own rights, of lands granted under the Coal Lands Acts, including school lands. Congress granted each of the western public land states designated sections of federal lands upon the admission of the western states to the Union for the express purpose of supporting public schooling. *See Andrus v. Utah*, 446 U.S. 500 (1980). Some of those lands were subject to the reservations of the Coal Lands Acts.[11] The decision of the Tenth Circuit calls into question the Amici States' ownership of coalbed gas underlying all lands granted under those Acts and ignores the rule articulated in *Wyoming v. United States* that "the legislation of Congress designed to aid the common schools of the states is to be construed liberally rather than restrictively." *Wyoming*, 255 U.S. at 508 (*citing Beecher v. Wetherby*, 95 U.S. 517, 526 (1877) and *Johanson v. Washington*, 190 U.S. 179 (1903)).

The Tenth Circuit's ruling imposes no small burden on the Amici States. Monies generated from coalbed gas

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[11] In 1912, Congress acted to permit states to make "in lieu" selections of known federal coal lands, subject to a reservation of coal to the United States in accordance with the 1910 Act. Act of April 30, 1912, 37 Stat. 105, codified at 30 U.S.C. Section 98 (the "1912 Act").

production are tied directly to school funding and cannot be replaced by other revenue sources. For example, in Utah, royalties from coalbed gas production are the largest single source of revenue from that state's school lands. If the Tenth Circuit's decision is upheld, Utah could lose ownership of coalbed gas underlying more than 27,000 acres of school lands, resulting in the loss of tens of millions of dollars that would otherwise be placed in Utah's Permanent School Fund. Utah's Permanent School Fund not only supports public education, but provides essential services for the disabled. The other Amici States would be similarly affected. New Mexico could lose more than 10,000 acres of gas production that fund common schools and institutions such as the Miners' Hospital of New Mexico, the New Mexico Boys' School, and the New Mexico School for the Deaf. Wyoming could lose more than 13,000 acres of potential revenues from gas production to fund its beleaguered school financing system.

Certainly, with respect to the non-school lands, as a result of Tenth Circuit's decision, the Amici States may enjoy 50 percent of the federal royalties derived from leases of coalbed gas on private lands patented under the 1909 and 1910 Acts. As a matter of principle, however, the Amici States believe that the decision reached by the Tenth Circuit is wrong in its expansion of the express reservation of patents, and should be reversed.

(B) Divesting Property Owners of Vested Property Interests

The Tenth Circuit's decision presents an immediate problem for property owners, as well as all those whose incomes rely upon them in the Amici States. There are hundreds of thousands of successors to Coal Lands Act patents throughout the Amici Sates. The unleased property owners now face a very real dilemma: either they lease their natural gas interests, and face the possibility of litigation over whether any gas production is coalbed gas, or they do not lease and thereby lose potential royalty payments from non-coalbed gas sources.[12] Since natural gas migrates, if these owners do not lease, their neighbors could deplete their gas reserves. The people impacted are typically individuals who planned to use royalty proceeds for purposes such as land improvements, college educations, and retirement. These successors to the 1909 and 1910 Acts patents would be required to live with continuing uncertainty under the Tenth Circuit's opinion. That uncertainty will inescapably lead to many rounds of otherwise unnecessary litigation over the ownership of the natural gas estate.

The Tenth Circuit's opinion, if left to stand, introduces ongoing title uncertainty in the production not

[12] The Enzi Act, P.L. No. 105-367, 112 Stat. 3313 (1998), has a limited reach. The Act applies only to lands subject to a lease or contract in effect as of the date of its enactment. The Enzi Act will not apply to vast amounts of unleased lands. Wyoming producers who sought passage of the Enzi Act estimate that it affects only about 5% of the lands patented under the 1909, 1910, and 1912 Acts.

only of coalbed gas, but because of its migratory nature, other natural gas reserves. Gas producers will be subject to mineral trespass claims and royalty owners to claims of conversion of property belonging to the United States or its successors in interest. Operators may be required to negotiate new leases with coal owners, reimburse the federal government or its successors in interest for royalty payments made to the owners of the oil and gas estate, and then seek to recoup monies paid under leases previously entered in justifiable reliance on the belief that gas is gas. The economic incentive to produce coalbed gas will quickly dissipate if the Tenth Circuit's decision is affirmed.

CONCLUSION

Because the Tenth Circuit's decision upsets fundamental tenets of property law and the rule that patent reservations must clearly articulate the property interests reserved at the time the patent issued, and due to the significant impact a change of ownership of the gas estate in coalbeds will have on the states, their local economies,

and their citizens, the Amici States ask this Court to reverse the decision of Tenth Circuit Court of Appeals.

Respectfully submitted,

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No. 98-830

Supreme Court, U.S.
FILED
MAR 5 1999
CLERK

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1998

AMOCO PRODUCTION COMPANY,
on behalf of itself and the class it represents,

Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,

Respondent.

BRIEF OF AMICUS CURIAE
LA PLATA COUNTY, COLORADO

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f.o.

QUESTION PRESENTED

Whether, in reserving to the United States "coal" in lands patented under the 1909 and 1910 Coal Lands Entry Acts, 30 U.S.C. §§ 81, 83-85, while passing the surface land and all other minerals (including natural gas) to the patentee, Congress reserved only the solid rock fuel commonly known as "coal," but not natural gas in coal formations.

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STATEMENT OF INTEREST OF AMICUS CURIAE

La Plata County (the "County") is located in southwestern Colorado. The State of New Mexico lies south of the County's southern border. Respondent, Southern Ute Indian Tribe, is a sovereign nation predominately located within the boundaries of La Plata County, Colorado. (App. 1, Vicinity Map of La Plata County, Colorado). Much of the property owned by the Southern Ute Tribe is situated on a reservation or other property held in trust by the federal government within the County. The dispute giving rise to the issue before this Court originated in La Plata County in 1991.

La Plata County is a mineral rich county producing more methane gas than most other Colorado counties combined. Within its borders lie approximately 2000 gas wells, which is one of the single largest proliferations of gas wells within the state. See *Colorado Oil & Gas Conservation Commission Statistics* available in www.dnr.state.co.us/oil-gas/info/ogstat.html. The gas production from these wells has provided significant tax revenues to the County and stability to the local economy. In recent years, and in reliance on federal law and the opinions of the federal government, La Plata County has assessed and levied taxes on those owning and engaged in the exploitation of oil and gas properties, including the extraction of oil and gas. Such taxes and assessments comprise a significant portion of the County's tax revenue. For example, in 1998 alone, oil and gas properties consisted of approximately fifty percent (50%) of the total valuation of all properties in La Plata County. (App. 2, Total Valuation; La Plata County, Colorado).

The County's authority for taxing oil and gas production is, of course, based upon Colorado law. Assessment and taxation of real and personal property is a creature of the Colorado Constitution. *Colo. Const.* Art. X § 3. In 1992, Colorado adopted a Constitutional amendment whereby the taxation of residential property may not exceed a fixed amount of twenty-one percent (21%) of its actual value without an affirmative vote of the electorate. *Colo. Const.* Art. X § 20. However, oil and gas

properties are presently assessed at the greater percentage of eighty-nine and one-half percent (89½%) of actual value for primary production. *Colo. Const.* Art. X § 3(1)(b).[1] Accordingly, in 1998 the valuation of oil and gas in La Plata County was $561.7 million dollars, twice the valuation of all residential properties located within the County. (App. 2, "Total Valuation: La Plata County, Colorado").

Most of this highly valued oil and gas is located within the exterior boundaries of the Southern Ute reservation and the majority of the coal-bed methane ("CBM") is owned by the Tribe. (App. 3, Fruitland Coal-bed Methane Development as of April 9, 1998, Ignacio Blanco Field Southern Ute Indian Reservation Prepared by Southern Ute Department of Energy. Pink legend = Tribal coal/Tribal oil & gas. Green legend = Tribal coal/fee oil & gas). However, significant amounts of CBM, and more specifically the CBM at issue in this case, is owned in fee by non-tribal parties.

The issue of the disputed ownership of this CBM would not be of import to the County but for the fact that although located within the County, property owned by the Tribe is exempt from taxation. 25 U.S.C. § 465. Accordingly, should this Court find that the United States retained ownership of coal-bed methane when Congress reserved "coal" to the United States under the 1909 and 1910 Coal Land Entry Acts, 30 U.S.C. §§ 81, 83-85, the Tribe's ownership of CBM would be significantly expanded and CBM presently held in fee and taxable would transfer to the Tribe. As such, it would be exempt from taxation. 25 U.S.C. § 465.

To fully appreciate the effect on the County of exempting such property from taxation, it should be noted that presently almost one-half of the lands situated in La Plata County are already

[1] In its petition for Writ of Certiorari, Amicus incorrectly understated the assessed percentage of actual value placed on oil and gas property as only twenty-nine percent (29%). Assessing the resource at eighty-nine and one-half percent (89½%) of actual value further magnifies the County's potential plight.

tax-exempt as a result of such lands being held either by Native American Tribes,[2] the federal government, or the State of Colorado. (App. 4, Nontaxable Properties). Conservative projections estimate that if the Tenth Circuit's decision is upheld, approximately twenty-five percent (25%) of the taxable valuation of gas production in La Plata County will be removed from the ad valorem tax base. See "Potential Economic Impacts of the Coal-bed Methane Dispute in La Plata County, Colorado", Office of Economic Analysis and Business Research, Fort Lewis College, 1997. The exemption of additional properties would result in the loss of significant revenues to the County and the school districts and special districts located within the County. In light of the drastic consequences it will have on the County and the County's school districts and special districts, the County urges the Court to carefully review the legal arguments advanced herein and by the Petitioners which support reversal of the Tenth Circuit decision in Southern Ute Indian Tribe v. Amoco Production Co., 151 F.3d 1251 (10th Cir. 1998).

[2] A small tract of land in La Plata County makes up part of the Ute Mountain Ute reservation which is predominately contained in Montezuma County, Colorado.

SUMMARY OF ARGUMENT

In 1909 and 1910, the plain and ordinary meaning given to coal was a "solid." Accordingly, in reserving to the United States "coal" in lands patented under the 1909 and 1910 Coal Lands Entry Act, 30 U.S.C. §§ 81, 83-85, Congress reserved only the solid rock fuel known as "coal," not natural gas in coal formations. Later Acts of Congress specifically reserving gases and other minerals support the conclusion that Congress did not intend to reserve the CBM at issue. Finally, the lower Court's ruling raises the question of the character and nature of the CBM gas that escapes the coal-seam where there is no chemical difference between that remaining in the coal-bed and that which has migrated.

ARGUMENT

In 1909, at the time of the enactment of the first Coal Land Entry Act, Congress never envisioned that what was then known as "marsh gas", presently referred to as CBM, would ever obtain the value it presently enjoys. See, James E. Fassett, *Coal-bed Methane -- a Contumacious, 3-Spirited Bride; the Geologic Handmaiden of Coal-beds*, in ENERGY FRONTIERS IN THE ROCKIES, 131, 132 (John C. Lorenz, et. al. eds, 1989); Southern Ute Indian Tribe v. Amoco Production Co., 151 F.3d 1251, 1268 (10th Cir. 1998) (Dissent). "Marsh gas" was then a known hazard and waste product of coal mining with no contemplated present or future value. Recently, however, technological developments have established methods by which the CBM gas is removed from the ground. Much of the gas is located within the coal deposits, which act as reservoirs for the CBM gas. Given this change in the circumstances regarding the ability to produce CBM from the coal reservoirs, this Court is presented with two intertwined issues: whether a gas produced from within coal is a part of the coal and whether the United States Congress in 1909 and 1910 meant to reserve this coal contained gas when it retained ownership of the coal.

The pertinent parts of the 1909 and 1910 Acts establish that coal underlying the homestead lands was reserved for subsequent mining and removal. 30 U.S.C. § 81, 83-85. No further mention is made in either Act as to the reservation of any gas or other rock or mineral. Id. It has long been held that when a statute does not define a word, such as coal in this case, it is interpreted by its ordinary or natural meaning. See, Smith v. United States, 508 U.S. 223, 228 (1993). Though it is understood that Petitioner and Respondents will appropriately analyze in depth whether the turn-of-the-century Congress meant to include gas within the term "coal", a simple review of the contemporary dictionary definition of coal available to that legislature indicates its ordinary and natural meaning as a "solid." AMERICAN DICTIONARY OF THE ENGLISH LANGUAGE, 244 (1889) cited in Southern Ute Indian Tribe v. Amoco

Production Co., 874 F. Supp. 1142, 1153 (D. Colo. 1995). The District Court and the Dissent on appeal grounded their decisions in a common sense analysis, namely, that the 1909 and 1910 Congresses intended "coal" to mean the solid rock substance. Southern Ute Indian Tribe v. Amoco Production Co., 151 F.3d 1251, 1268-1269 (10th Cir. 1998) (Dissent); Southern Ute Indian Tribe v. Amoco Production Co., 874 F. Supp. 1142 (D. Colo. 1995).

Furthermore, both of these Courts were acutely sensitive to the problems associated with the classification of all CBM as part of the coal from which it is derived because CBM often does not remain within the coal, but rather escapes into adjacent reservoir rock. One need only have lived in this area during the last ten years to know that methane seepage, caused partially at least as a result of gas exploration and extraction, has occurred in various areas throughout the County, sometimes at extremely dangerous levels. (Appendix 5, Durango Herald, "Officials Propose Monitoring Coal-bed," October 31, 1998, John Peel). The Tenth Circuit Court failed to address the coal-bed methane which migrated to adjacent non-coal strata because the Court was primarily concerned with the CBM remaining within the coal-bed. However, the question left unanswered is the character and nature of the CBM that has escaped. Is it coal? The Tenth Circuit fails to confront this issue because, as Judge Tacha appropriately stated in her dissent, "[the majority] would find itself in the uncomfortable position of saying that Congress might have thought that some CBM is coal (i.e., the CBM trapped in coal deposits), but that some CBM definitely is not coal (i.e., the escaped CBM), even though there is no chemical difference between the two groups of CBM." Southern Ute Indian Tribe v. Amoco Production Co., 151 F.3d at 1270.

It is also significant to note that a few years after the 1909 and 1910 Acts, Congress broadened its reservation of coal by specifically reserving "other minerals," as in the Homestead Act of 1916, 43 U.S.C. § 299, and actually reserving the "gas and other named minerals" on lands rich with those minerals in the Act of

July 17, 1914, 30 U.S.C. §§ 121-123. These later more expansive reservations of specific minerals and gas further support the conclusion that Congress did not intend to reserve any mineral or gas other than coal in the 1909 and 1910 Acts.

Lastly, since CBM has only recently enjoyed status as a useful resource, Judge Tacha's observations on behalf of the dissent follow the logic that since CBM was considered a waste product in 1909, "[i]ts ownership [was not] desirable" and, therefore, "one would not expect the United States to reserve it". Southern Ute Indian Tribe v. Amoco Production Co., 151 F.3d at 1269. Common sense dictates that it is illogical to conclude that the single term "coal" could imply a reservation of both coal and other gases when, at the time of the Acts, CBM was undesirable. It follows then that "the fact that CBM had no value confirms the plain meaning, rather than creating an ambiguity" in both the 1909 and 1910 Act. Id. at 1269.

CONCLUSION

This Court should reverse the ruling of the Tenth Circuit Court of Appeals.

RESPECTFULLY SUBMITTED this 5th day of March, 1999.

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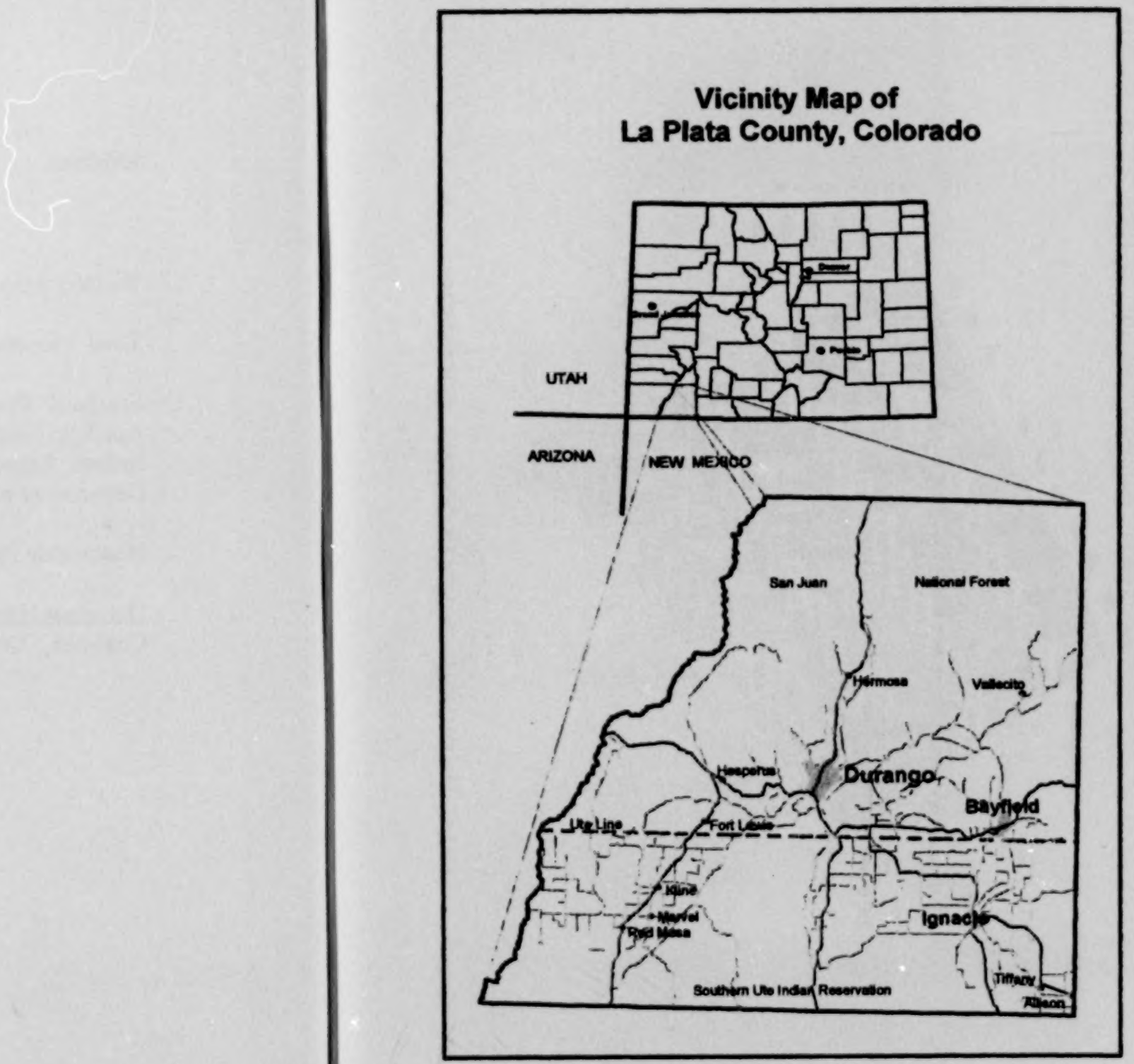

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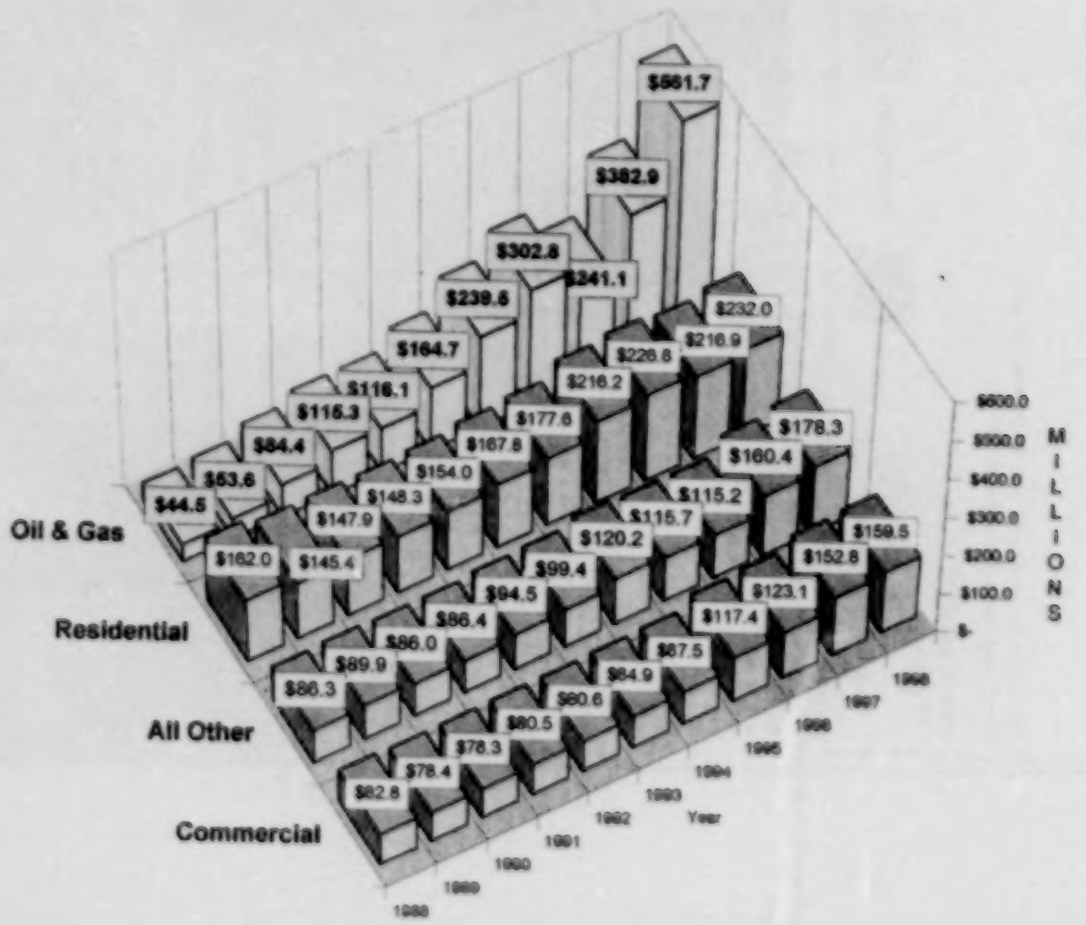

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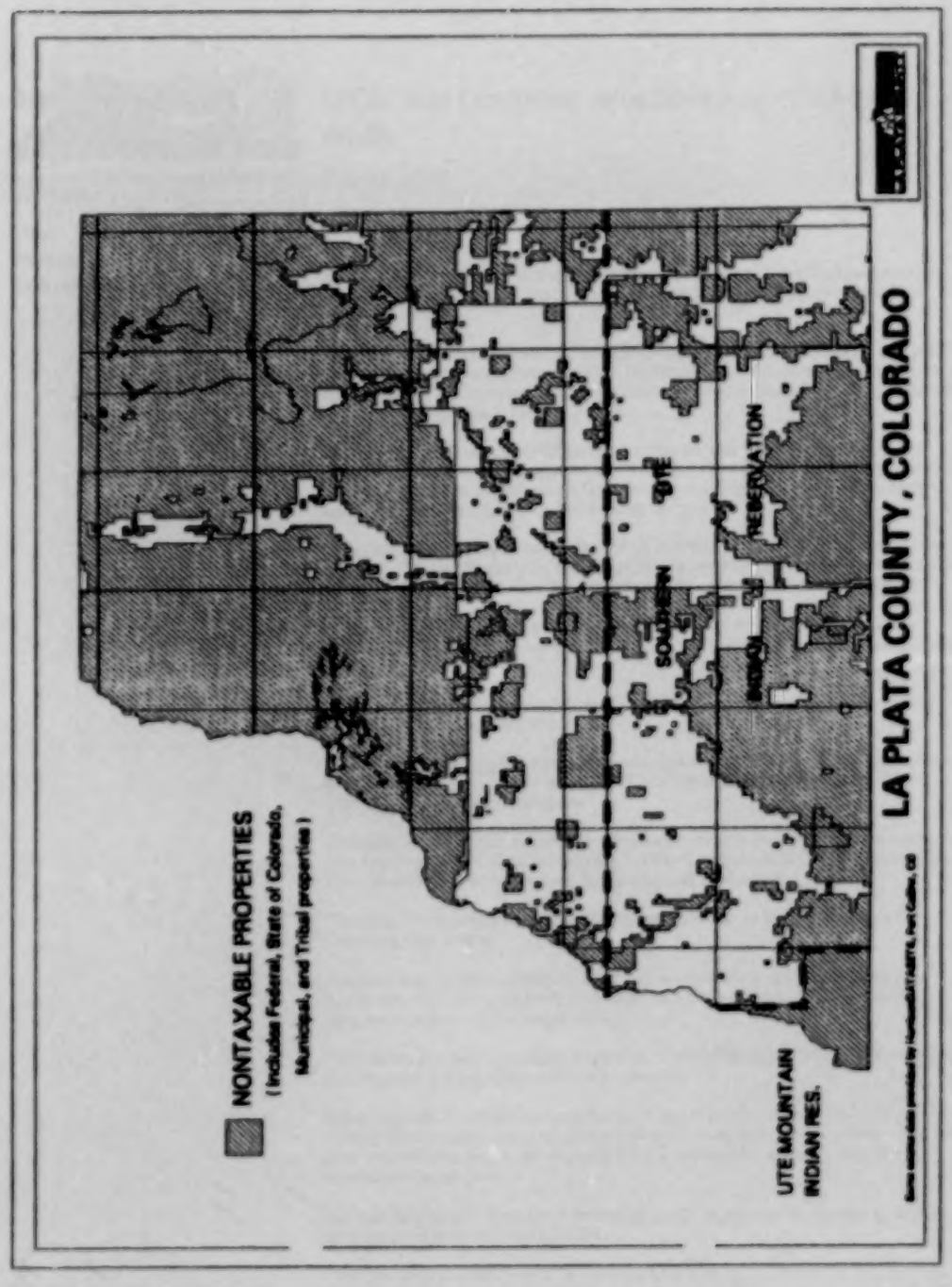

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Officials propose monitoring coal-bed wells

Oct. 31, 1998

By John Peel
Herald Staff Writer

The Colorado Oil and Gas Conservation Commission's staff has proposed a coal-bed monitoring plan that a La Plata County official Friday called "the dream we're after."

The plan is to cluster at least three monitoring wells at five locations along the Fruitland outcrop in La Plata County. Equipment would monitor water levels in the coal beds. Officials hope the monitors would provide data to help understand gas seeps and, perhaps, coal-bed fires.

The COGCC's seven-member governing board will hear the plan at its Dec. 3 meeting in Denver. If it is approved, COGCC Director Rich Griebling said the state will be asked to provide state severance tax funds for the project as an amendment to the COGCC's 1999-2000 budget.

"I think it looks great," county Technical Adviser Warren Holland said of the proposal. "If we can get that, that's the dream we're after. It sure is exactly what we need to understand what's happening at the outcrop for the first time."

Holland testified before the COGCC commission Oct. 20 that he believes dewatering the coal beds to extract methane gas could cause fires to begin in the coal.

He also believes the dewatering may have led to gas seeps along the outcrop, specifically near the Pine River.

"They've been struggling with obscure to poor data ... without having anything definitive," Holland said of the COGCC. "This achieves some of the deep concerns I've had over the years."

Griebling and COGCC Engineering Manager Morris Bell on Monday visited the area where coal-bed fires are burning on the Southern Ute Indian Reservation. They also looked at monitoring data compiled by the tribe.

"Frankly, it was some of the data that convinced us to kick this study off," Griebling said Friday.

Amoco Corp. funded a study in 1993 to measure methane seeps in the Pine River area. Griebling said it is important this time to have the state fund a long-term project of this magnitude.

"I think we learned something from that," Griebling said. "We feel like having funding and having direct control is essential."

Griebling said if COGCC commissioners approve the project – which he said already has received some negative feedback from industry members – the next step would be to secure the funding from a committee that oversees the severance tax money.

He said he hopes to have the monitoring wells in place and providing data by July, or at least by the end of 1999.

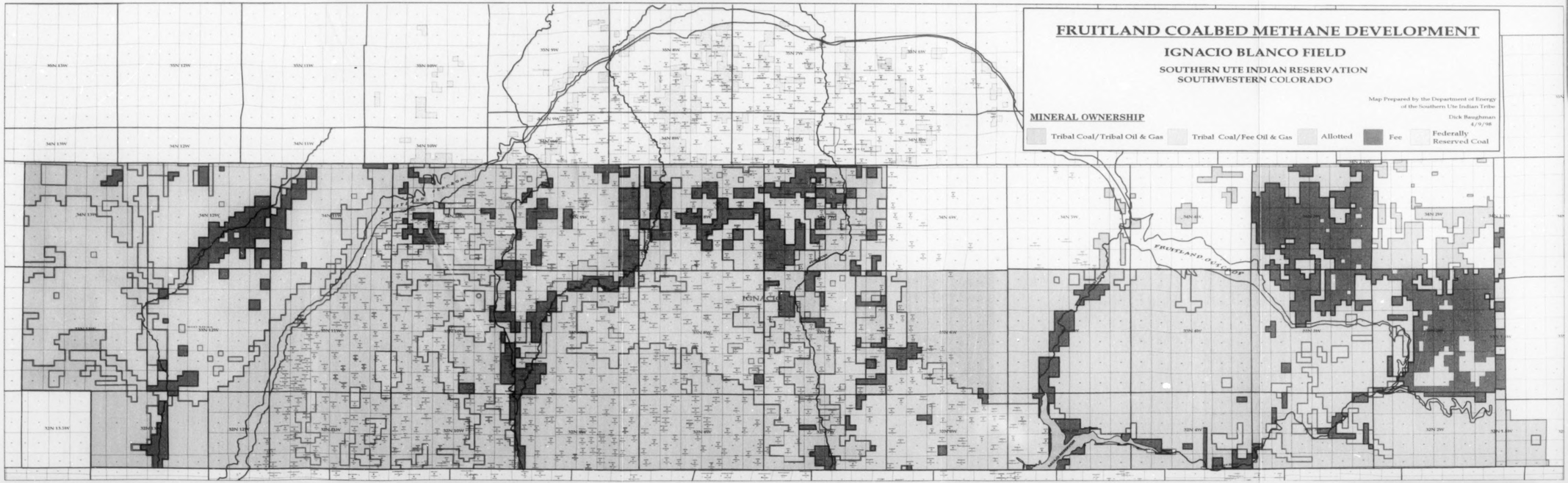
The five well clusters would be based along a 28-mile section of the outcrop. Locations proposed are near the Animas River at Carbon Junction, the Florida River, the South Fork of Texas Creek, the Pine River and Beaver Creek.

Other sites could be added. Griebling said at least three monitoring wells would probably be drilled at each site, with each well monitoring an individual coal

bed.

Several entities would be involved in the program, including the COGCC, the county, the Bureau of Land Management, the Southern Utes, oil and gas companies and professional geologists and engineers.

Holland said he believes the Gas and Oil Regulatory Team – a group set up in 1994 to study gas seeps and other gas development concerns in La Plata County – would have a hand in the project.



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No. 98-830

In The

Supreme Court of the United States

October Term, 1998

AMOCO PRODUCTION COMPANY, on behalf of itself and the class it represents,

Petitioners,

vs.

SOUTHERN UTE INDIAN TRIBE,

Respondent.

On Writ Of Certiorari
To The United States Court Of Appeals
For The Tenth Circuit

BRIEF OF *AMICI CURIAE* THE COAL BED METHANE AD HOC COMMITTEE, THE WYOMING INDEPENDENT PRODUCERS' ASSOCIATION AND THE INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA IN SUPPORT OF PETITIONERS

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INTEREST OF *AMICI CURIAE*

The Coal Bed Methane Ad Hoc Committee ("the Committee"), the Wyoming Independent Producers' Association ("WIPA"), and the Independent Petroleum Association of America ("IPAA") file this brief *amici curiae* in support of petitioner Amoco Production Company ("Amoco").[1]

The Committee is comprised of Wyoming landowners and oil and gas companies, supported by other landowners, a local bank, and a pipeline company. All are directly interested in the development of the coal bed methane resources in the Powder River Basin in northern Wyoming. The landowners hold patents, subject to the reservation of "coal" under 30 U.S.C. §§ 81-85, issued by the Department of the Interior under various statutes disposing of the public lands to encourage the settlement and cultivation of our western States. The oil and gas companies, the bank, and the pipeline company all have interests and investments deriving from leases issued by the landowners and from allied projects to develop and transport the projected high volumes of coal bed methane production from the Powder River Basin.

WIPA and IPAA represent, on a state and national level respectively, thousands of independent producers of natural gas and oil on all issues affecting their members'

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[1] The parties have consented in writing to the filing of this brief. Their letters have been filed with the Clerk of the Court. Counsel for the parties did not write any part of this brief; the undersigned counsel is its sole author. Persons other than the *amici curiae* or their members who made a monetary contribution to the preparation of the brief are listed in Appendix A at the end of this brief. The members of the Committee are also identified in Appendix A.

interests. The decision below has created a cloud over the title to coal bed methane in a vast area of the country. WIPA's and IPAA's members are vitally interested in resolving the doubts created by the decision below so that they may proceed with the development of potentially tens of trillions of cubic feet of coal bed methane resources.

BACKGROUND

To facilitate the development of this largely untapped resource, the United States Department of the Interior published a formal opinion in 1981, addressing the effect of the reservation of "coal" under the two statutes at issue here: an Act of March 3, 1909, 35 Stat. 844 ("the 1909 Act") and an Act of June 22, 1910, 36 Stat. 584 ("the 1910 Act"). After careful analysis, the Solicitor concluded that "coalbed gas was not reserved with federal coal in . . . patents issued subject to the 1909 and 1910 Acts." (Pet. App. 150a.)

The Southern Ute Tribe challenged this interpretation in the present case. In the district court, Judge Babcock granted summary judgment for Amoco and the defendant class, giving deference to the Solicitor's opinion. On appeal the Tenth Circuit reversed.

As it should, the Tenth Circuit acknowledged that the task before it was one of effecting "the will of Congress. . . . " (Pet. App. 10a, quoting *Griffin v. Oceanic Contractors, Inc.*, 458 U.S. 564, 570 (1982)). The court of appeals found Congress' intent "ambiguous" as to whether coal bed methane was included in the reservation of "coal" in the 1909 and 1910 Acts. (Pet. App. 8a-9a.) The court admitted "Congress' awareness [in 1909] that CBM [coal bed methane] was released as a hazardous

byproduct of coal mining" (Pet. App. 20a) and the "fact that CBM could not be commercially extracted from coal in 1909. . . . " (Pet. App. 21a.) The court even quoted with approval the observation of the Pennsylvania Supreme Court that, despite their proximity in coal seams, "[c]oal and coalbed gas are, nevertheless, separate physical entities." (Pet. App. 22a.)

Noting that Congress did not expressly mention coal bed methane in the 1909 and 1910 Acts, the Tenth Circuit invoked the interpretive guideline that "land grants are construed favorably to the Government" and "that nothing passes except what is conveyed in clear language. . . . " (Pet. App. 11a quoting *Watt v. Western Nuclear, Inc.*, 462 U.S. 36, 59 (1983)). Placing the "burden" upon Amoco "to dispel any ambiguity in the construction of the coal reservation" (*id.*), the court found no clear language conveying the coal bed methane to the patentees. "Rather," the court concluded, "where the commercial value of CBM was unappreciated at the time of the enactment, the texts of these acts gives us no particular indication" of Congress' intent (Pet. App. 21a), and the coal bed methane was therefore not conveyed by the patents. (Pet. App. 32a.)

In the face of what the court of appeals regarded as so much uncertainty over congressional intent, the court was able to discern only one affirmative indication that Congress probably meant for the coal bed methane to belong to the owner of the reserved coal. It stated that the 1909 and 1910 Acts did not just reserve coal that could be, as of the date of enactment, mined economically. Instead, in the court's view, Congress reserved "all the coal." (Pet. App. 29a.) From this the court drew a sweeping inference.

> Congress knew there was indeterminate potential value in the reserved coal and intended to secure that value for the United States. Rather than indicating a limited reservation of coal to the United States, the legislative history suggests that Congress adopted an interpretation of coal which encompassed both the present and future economic value of coal for energy purposes, including value that could only be realized through advances in technology such as those which drive the present day exploration for CBM.

(Pet. App. 30a.)

SUMMARY OF ARGUMENT

The court of appeals' fundamental error was its mechanical application of the canon of construction resolving doubts over grants of federal lands in favor of the government, an approach already rejected by this Court in *Leo Sheep Co. v. United States*, 440 U.S. 668, 682-83 (1979). Even if this were a case where Congress neither expressly included nor expressly excluded rights to minerals, the "essential" inquiry would be "whether the congressional will is otherwise made manifest" by other means, such as reading the statute "in the light of other statutes and a settled public policy in respect of mineral lands," *United States v. Sweet*, 245 U.S. 563, 567 (1918), or considering "the condition of the country when the act [was] passed," as well as its purpose and text viewed as a whole. *Winona & St. Peter RR Co. v. Barney*, 113 U.S. 618, 625 (1885).

Furthermore, the court of appeals disregarded a long line of this Court's cases construing statutes affecting the rights of homesteaders in their favor. Recognizing that

the "policy of the Federal Government in favor of settlers upon public lands has been liberal . . . ," *Clements v. Warner*, 65 U.S. 394, 397 (1860), this Court has held that, where a statute contained a limitation on or exception to the rights granted, "the liberal policy of Congress in favor of the actual settler *is better accomplished by a restrictive rather than extensive interpretation*" of the limitation or exception. *Id.* at 397-98 (emphasis added).

The history surrounding the enactment of the 1909 and 1910 Acts demonstrates that those receiving patents subject to their provisions received full title to the land save only for the one mineral the land was deemed "valuable for:" coal. 30 U.S.C. §§ 81, 83 & 85. All other minerals which, at the time the patent issued, the land was not thought "valuable for" passed to the patentee along with the rights to the surface. Indeed, even known deposits of coal continued to be patented without reservation where the deposits were not "valuable" enough.

Plainly, lands patented subject to these two Acts were not deemed valuable for coal bed methane. (Pet. App. 21a.) And Congress' decision to continue granting to patentees the rights to insufficiently valuable deposits of coal undermines the court of appeals' inference that Congress intended to preserve for the government the "future economic value" of coal to be later unlocked by "advances in technology. . . . " (Pet. App. at 30a.) On the contrary, it was precisely those values Congress intended to convey by patent. Settled public policy respecting mineral lands compels the construction, therefore, that Congress reserved only the solid rock coal itself; and patentees under these Acts were otherwise "entitled to a patent without reservation. . . . " 30 U.S.C. § 81.

Finally, there is no force behind respondents' contentions that the effects of extracting coal bed methane from coal militate against a finding that Congress severed the rights to the two resources. Congress in 1909 was aware of the difficulties of simultaneous development of coal estates that were separate from oil and gas estates, and those difficulties are no greater when the rights to coal bed methane are separate from the rights to the coal.

ARGUMENT

I. THE 1909 AND 1910 ACTS DID NOT ALTER SETTLED CONGRESSIONAL POLICY GRANTING TO PATENTEES THE RIGHTS TO ALL MINERALS EXCEPT THOSE CONSIDERED FORESEEABLY COMMERCIALLY VALUABLE AT THE TIME OF PATENTING.

To be sure, the 1909 and 1910 Acts neither employ the phrase "coal bed methane" nor define the term "coal." If they did, "it would be conclusive of the will of Congress upon the point." *United States v. Sweet*, 245 U.S. at 567. Of course, Congress does not need to define a term for its meaning to be plain, and we concur in and defer to Amoco's excellent presentation of Congress' intent in using the word "coal." Assuming one could find ambiguity in so familiar a word, however, we would appropriately resort "to the history of the times" when the statutes were passed, *Leo Sheep Co. v. United States*, 440 U.S. at 669, to discern the legislative intent.

From the Civil War to the turn of the twentieth century, the general policy of the United States was to encourage the settlement and improvement of the western states by granting patents – full fee simple title – to

persons developing the public lands for the various purposes specified by statute. These laws relied to some extent on the belief that lands could be classified by the use to which they could best be put. "Under the old system of land classification, the disposition of land owned by the United States depended upon whether it was classified as mineral land or nonmineral land, and title to the entire land was disposed of on the basis of the classification." *Watt v. Western Nuclear, Inc.*, 462 U.S. 36, 47 (1983) (explaining former land classification system).

The nonmineral land laws were not limited in scope to land completely free of minerals. On the contrary, they applied to lands not "known at the time of sale to be valuable" for minerals. *Deffeback v. Hawke*, 115 U.S. 392, 404 (1885). The fundamental precept was that what mattered was the value of land for minerals at the time it was disposed of.

> It is quite possible that lands settled upon as suitable only for agricultural purposes, entered by the settler and patented by the government under the preemption laws, may be found, years after the patent has been issued, to contain valuable minerals. Indeed, this has often happened. We therefore use the term *known* to be valuable at the time of sale, to prevent any doubt being cast upon titles to lands afterwards found to be different in their mineral character from what was supposed when the entry of them was made and the patent issued.

Id. at 404-05. Whether lands were valuable for minerals was to "be determined according to the facts in existence at the time" the patent issued, *Colorado Coal & Iron Co. v. United States*, 123 U.S. 307, 328 (1887), for a "change in the conditions . . . whereby new discoveries are made . . . cannot affect the title as it passed. . . . " *Id.* And the

relevant facts at the time of patenting were those addressing whether the minerals "were in such quantity as to justify expenditures in the effort to extract them." *Deffeback v. Hawke*, 115 U.S. at 404.

By the turn of the century, therefore, it was well-known that the grant of full fee patents to entrymen, which included mineral rights that could prove valuable in the future, was the key to the national plan "to induce settlement, cultivation, and the establishment of homes upon the public lands." *Ware v. United States*, 154 F. 577, 584 (8th Cir. 1907). This Court had by then settled on a rule of construction highly solicitous of those entering the public lands for homesteading, recognizing that the "policy of the Federal Government in favor of settlers upon public lands has been liberal . . . ," *Clements v. Warner*, 65 U.S. 394, 397 (1860), and where a statute contained a limitation on or exception to the rights granted, that "the liberal policy of Congress in favor of the actual settler *is better accomplished by a restrictive rather than extensive interpretation*" of the limitation or exception. *Id.* at 397-98 (emphasis added).

This rule of construction was applied to protect settlers both from claims of others, *id.*; *Oregon & California RR Co. v. United States*, 189 U.S. 103 (1903), and from loss "through the mistake or neglect of the officers or agents of the Government." *Great Northern Ry. Co. v. Reed*, 270 U.S. 539, 546 (1926). In its most frequently quoted expression of the rule, this Court declared that "[t]he law deals tenderly with one who, in good faith, goes upon the public lands, with a view of making a home thereon." *Ard v. Brandon*, 156 U.S. 537, 543 (1895). The Court later reinforced its position: "With this declaration, in all its fulness, we heartily concur, and have no desire to limit it in

any respect. . . . " *Tarpey v. Madsen*, 178 U.S. 215, 220 (1900).

By the time Congress considered the 1909 and 1910 Acts, the accepted rule of construction was "that the statutes should not be construed strictly and harshly against the homesteader, but that the land laws should be administered liberally to fulfill their purpose," *United States v. Mills*, 190 F. 513, 521 (5th Cir. 1911), a rule of construction made particularly apt by Congress' decision to provide special homesteading rights to veterans of the Union army. *See generally Anderson v. Clune*, 269 U.S. 140 (1925) (discussing soldiers' additional homestead rights). *Accord Shiver v. United States*, 159 U.S. 491, 497-98 (1895) (contrary to the literal interpretation of the statutes, the Court holds that entrymen had a right to cut timber needed to establish a homestead). The rule of liberal construction also reflected that, like railroad land grants, homestead and desert-land patents were not gifts from the federal sovereign, but instead were the *quid pro quo* for years of labor and investment by entrymen. In other words, an entryman "*earned* the right to the lands described" in the patent. *Burke v. Southern Pacific RR Co.*, 234 U.S. 669, 680 (emphasis added).

It was against this backdrop that President Theodore Roosevelt approached problems his advisors perceived in the public land laws, especially as to coal lands. Under the Act of March 3, 1873, 17 Stat. 607, persons and associations could enter "vacant coal lands of the United States," subject to limitations on the acreage each could own, and obtain patents. 30 U.S.C. § 71. The restrictions on acreage led to controversies (and prosecutions) as developers attempted to assemble larger holdings for coal

mining. *See, e.g., United States v. Trinidad Coal & Coking Co.*, 137 U.S. 160 (1890).

Believing that the coal lands law and other public land laws inhibited the scientific management of vital resources such as water power, timber, forage, and minerals, President Roosevelt appointed a Public Lands Commission on October 22, 1903, to report on revisions. S. Hayes, CONSERVATION AND THE GOSPEL OF EFFICIENCY: THE PROGRESSIVE CONSERVATION MOVEMENT, 1890-1920 at 67 (1975). The Commission's first "partial report" issued in March 1904 alleging that "abuses" permeated the administration of the land laws and that the structure of the laws themselves often thwarted Congressional goals. S. Doc. No. 189, 58th Cong., 3d Sess. "Report of the Public Lands Commission" vi-vii & viii (1905) ("Commission Report"). Its second "partial report" in February 1905 urged that "the first essential for putting the remaining public lands to their best use is to ascertain what that best use is by a preliminary study and classification of them. . . . " Commission Report xiv.

Dissatisfied by congressional inaction on his Commission's report, President Roosevelt seized upon the allegations of fraud to further his agenda of more efficient use and federal management of the public lands. In a December 17, 1906, message to the Congress, Roosevelt explained that he had earlier that year directed the Secretary of the Interior "to allow no patent to be issued to public land under any law until by an examination on the ground actual compliance with that law has been found to exist." S. Doc. No. 141, 59th Cong., 2d Sess. 2 (1906) ("S. Doc. No. 141"). Also that year Roosevelt "withdrew approximately 64 million acres of lands thought to contain coal from all forms of entry. . . . " *Watt v. Western*

Nuclear, Inc., 462 U.S. 36, 48-49 (1983). The withdrawals were modified on the date of the President's message, *Conway v. Brooks*, 39 Pub. Lands Dec. 337, 339 (1910), to permit "agricultural entries . . . within a withdrawn area." *Instructions*, 40 Pub. Lands Dec. 418, 419 (1912). Entrymen received notice of the withdrawals by notations in the tract books of local land offices that the lands were "coal lands," *Instructions*, 35 Pub. Lands Dec. 681 (1907), pending final classification of the land by the USGS. *Nelson J. Littlejohn*, 44 Pub. Lands Dec. 48, 52 (1915).

Some entrymen, then, had entered before the withdrawals; others after. "In both instances, under the state of the laws then in force, the nonmineral claimant must have lost had the land ultimately been determined to be valuable for the coal deposits." *Instructions*, 40 Pub. Lands Dec. at 419. President Roosevelt had no intention, however, of making these lands available for patent under the coal land laws either.

> The present coal law limiting the individual entry to 160 acres puts a premium on fraud by making it impossible to develop certain types of coal fields and yet comply with the law. It is a scandal to maintain laws which sound well, but which make fraud the key without which great natural resources must remain closed. The law should give individuals and corporations under proper government regulation and control . . . the right to work bodies of coal land large enough for profitable development. My own belief is that there should be provision for leasing coal, oil, and gas rights under proper restrictions.

S. Doc. No. 141 at 2. Congress was not yet prepared, however, to abandon the policy of encouraging development by placing publicly-owned resources into private hands, and another fourteen years would pass before the Mineral Lands Leasing Act of 1920 would turn President Roosevelt's "own belief" into statutory form.

In the meantime, opposition to the land withdrawals grew as frustrated entrymen found their homestead and desert land entries in limbo. But the withdrawals continued. Between July 1909 and June 1911 an additional 57 million acres of potential coal lands were withdrawn pending classification. 31st Annual Report of the Director, USGS, to the Secretary of the Interior 46 (1910); 32nd Annual Report of the Director, USGS, to the Secretary of the Interior 65 (1911). Eventually withdrawals exceeded 140 million acres. President Roosevelt created within the USGS a Land Classification Board to, among other tasks, permanently classify lands chiefly valuable for coal. Because lands so classified could only be available under the coal land laws (which Roosevelt hoped to amend), the Board received numerous requests to "de-classify" withdrawn lands. 34th Annual Report of the Director, USGS, to the Secretary of the Interior 149 (1913) (236 requests between 1909-13).

His state severely affected by Roosevelt's initial withdrawals, *see* S. Rep. No. 61-703, at 2 (1910) (discussing coal lands in Wyoming), Representative Mondell of Wyoming secured a legislative compromise. In February 1909, the House Committee on the Public Lands reported out legislation giving persons whose patents had been withheld because of the Department's withdrawals the right to elect to receive a patent reserving to the United States "all coal" in lands "classified, claimed, or reported as being

valuable for coal. . . ." H.R. Rep. No. 60-2019 at 1 (1909). The report was critical of the Department's excessive withdrawals and the "unnecessary hardship and expense" they had caused entrymen. *Id.* at 3 & 4. On February 16, the bill was debated extensively on the floor of the House. The bill attracted colloquy on the reservation of the coal because "[i]t is the first legislation before Congress providing for a limited patent, or a patent reserving the mineral." 43 Cong. Rec. 2504 (1909) (remarks of Rep. Mondell).

> Mr. STEPHENS of Texas. Is it not a fact that valuable minerals are reserved now to the Government?
>
> Mr. MONDELL. No; that is not true. The patent having issued, the patent carries everything in the land with it, and the Supreme Court has decided in a number of cases that if the law be complied with in good faith and the entryman makes payment and final proof, thereafter the Government is barred from raising the question as to any mineral that may occur in the land.
>
> Mr. STEPHENS of Texas. That applies also to oil and coal?
>
> Mr. MONDELL. It applies to all kinds of minerals. In other words, the patents issued by the Government of the United States heretofore have been patents in fee.

Id. The debate disclosed that the Committee had considered and rejected the idea of reserving all minerals to the government. "We believe this is quite a sufficient departure from the past practice of the Government. The lands which this legislation will affect are lands which the department has claimed contain *some coals of value.*" *Id.* (remarks of Rep. Mondell) (emphasis added). The debate over the coal reservation concluded with Mr. Mondell's

hope that (as to future legislation) the reservation limited to coal "is as far as we will go in that direction [of mineral reservations]." *Id.*

As enacted, the bill offered a remedy for frustrated entrymen and others who had "in good faith located, selected, or entered under the nonmineral land laws"[2] lands "which subsequently are classified, claimed, or reported as being valuable for coal. . . . " 30 U.S.C. § 81. That remedy was in the form of an election. The person could avoid the expense and delay of a contest proceeding before the Department by agreeing to accept a patent which reserved to the United States "all coal in said lands, and the right to prospect for, mine, and remove the same."[3] *Id.* If he accepted the reservation, "no further inquiry [was] necessary respecting the coal character of the land." *Circular*, 38 Pub. Lands Dec. 183, 184 (1909). Alternatively, the person could contest "the character of the land located, selected, or entered by him . . . [as being] chiefly valuable for coal . . . ," and, if successful, was "entitled to a patent without reservation. . . . " *Id.* An unsuccessful contestant still was entitled to a patent, but subject to the reservation of coal. Some contested the

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[2] "The term 'selection,' as used in the land department, generally represents the filing or presentation of a claim by a State or a railroad company and is seldom used to indicate the claims of an individual, which is usually known as an 'entry' or a 'location,' as the case may be." *State of Utah*, 38 Pub. Lands Dec. 245, 247 (1909) (concerning state selection of lands under grant for public buildings).

[3] Anyone authorized to mine the federal coal could enter the land "upon such conditions as to security for and payment of all damages to such owner caused thereby as may be determined by a court of competent jurisdiction." 30 U.S.C. § 81.

withdrawals and classifications, *e.g. Ada I. Hindman*, 42 Pub. Lands Dec. 327 (1913); some did not.

The 1909 Act addressed the discrete problem of persons who had acted prior to President Roosevelt's campaign of withdrawals. But the withdrawals had not stanched the flow of immigration onto the public lands, and the next session of Congress faced the issue again. Newspaper reports alerted the House Committee on the Public Lands of areas "settled [since 1906] . . . by squatters who waited patiently for an opportunity to file" homestead entries. H.R. REP. NO. 61-703 at 4 (1910). Arguing that "large areas" of the withdrawn lands "are directly in the path of settlement and development," *id.* at 3, Representative Mondell and the committee urged enactment of a bill extending the same election to persons on lands entered or selected after the withdrawals had been effected.

A committee report explained the detailed criteria by which the Interior Department determined whether coal-bearing lands had deposits sufficiently valuable to warrant their treatment as "coal lands." H.R. REP. NO. 61-377 at 4 (1910). During floor debate, some representatives voiced concerns that the bill would allow coal not presently known to be valuable into private hands and that "we ought to wipe out all restrictions whatsoever, and make it [the reservation] apply to all coal wherever it exists. . . . " 45 CONG. REC. 6156 (1910) (remarks of Rep. Wilson). An amendment to that effect was offered by Representative Reeder of Kansas. *Id.* at 6160. Emotions on the floor ran high as western representatives fought to maintain the bill with few amendments. *See id.* (remarks of Rep. Mondell) (opposing the Reeder amendment as an idea "that has never before been favored by anyone"),

and *id.* at 6157 (remarks of Rep. Taylor) (opposing objections to the bill as "stupid, eastern, theoretical, so-called conservation ideas that prohibit growth and development"). Their efforts were successful, both generally and specifically as to the Reeder amendment. *Id.* at 6164.

As enacted, the 1910 bill permitted entry on lands withdrawn or classified as coal lands under "the homestead laws by actual settlers only, [and] the desert land law. . . . " 30 U.S.C. § 83. It also opened those lands to selection under the Carey Act, 43 U.S.C. § 641, and to withdrawal under the Reclamation Act of 1902, 32 Stat. 388. Those who qualified obtained title "with a reservation to the United States of the coal in such lands and of the right to prospect for, mine, and remove the same."[4] *Id.* Alternatively, the entryman retained the right "to present and have prompt consideration of applications" to enter lands which had been classified as coal lands "with a view of disproving such classification and securing a patent without reservation." 30 U.S.C. § 85.

The statutory trilogy respecting Roosevelt's withdrawals was completed in 1914 with the enactment of a bill directing the Secretary, with regard to withdrawn lands ultimately "classified as noncoal in character," to replace each limited patent issued under the 1909 and

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[4] The 1910 Act contained slightly more elaborate provisions governing mining activities on the patented land. The Act distinguished "prospecting" activities, for which the prospector would be liable merely for "all damages to the crops and improvements," from "mining and removal of the coal," for which the miner would be more broadly liable for "payment of the damages caused thereby to the owner [of the land]. . . . " 30 U.S.C. § 85.

1910 Acts with a coal reservation with "new or supplemental patents without such reservation." 30 U.S.C. § 82 (Act of April 14, 1914, 38 Stat. 335).

This history shows the error of the Tenth Circuit's mechanical use of the presumption construing land grants in favor of the government grantor. *See Leo Sheep Co. v. United States*, 440 U.S. 668, 682-83 (1979) (harmonizing rules of interpreting public lands statutes). That presumption is simply one of many tools in divining congressional intent under the public land laws. And it has long been the rule that courts construing those laws must consider "the condition of the country when the acts were passed, as well as . . . the purpose declared on their face, and read all parts of them together." *Winona & St. Peter RR Co. v. Barney*, 113 U.S. 618, 625 (1885). In particular, courts are to take account of "settled public policy in respect of mineral lands." *United States v. Sweet*, 245 U.S. at 567. Over all these considerations, however, lies the policy that public land laws inducing private citizens and corporations to undertake work and investment on the "immense and undeveloped public domain" are to receive "a more liberal construction" than that suggested by the rule "that public grants are construed strictly against the grantees. . . . " *United States v. Denver & Rio Grande RR Co.*, 150 U.S. 1, 14 (1893).

Here the "condition of the country when the [1909 and 1910] acts were passed" was one in which the nation had not yet moved to a policy of reserving rights to all minerals for later leasing, as it later did in the Stock-Raising Homestead Act of 1916 ("SRHA"). *See Watt v. Western Nuclear, Inc.*, 462 U.S. at 37. The 1909 and 1910 Acts were the first *"limited"* step in that direction (Pet. App. 147a (House colloquy) (emphasis added)), with the

general rule remaining that all minerals the land was not "valuable for" were to pass to the patentee. The debate on the 1909 Act specifically acknowledged this Court's rulings holding that minerals of all types passed to the patentee unless the land was known to be valuable for a given mineral. 43 CONG. REC. 2504 (1909) (remarks of Rep. Mondell). And the Congress of 1909 and 1910 is fairly charged with the knowledge of this Court's rule of liberal construction of the homestead laws.

As the Tenth Circuit recognized, the coal bed methane is distinct from the coal, Congress was aware that it existed and posed a threat to safe coal mining, and in 1909-10 the methane was not forseeably producible. (Pet. App. 32a.) Therefore, the "more liberal construction" of intent compels the very opposite of the result the court of appeals reached applying, without further supporting analysis, the presumption against the grantee. In view of the rule of liberal construction and the settled policy of granting patentees the rights to minerals of only speculative value, it is apparent that if Congress had intended to reserve minerals the land was not "valuable for," such as coal bed methane, it would have done so expressly. This conclusion is further buttressed by Congress' continued solicitude for entrymen shown by its direction to the Secretary in 1914 to restore full fee title to those who elected to receive limited patents on lands subsequently determined to have insufficiently valuable coal.

Apart from invoking the presumption favoring the government where grants are ambiguous, the court of appeals could only support its conclusion by inferring that Congress' reservation of coal showed an intent to reserve even "indeterminate future value" in the coal. (Pet. App. 30a.) As we have shown at length, however,

history and the statutory text disclose that the court significantly overstated what Congress reserved. The 1909 and 1910 Acts did not reserve all coal on federal lands. Secretary Ballinger's 1909 regulations for the classification of coal lands – of which the Congress was fully aware in enacting the 1910 Act, H.R. REP. NO. 61-377 at 4 (1910) – made it evident that many lands with abundant coal deposits which were too deep for mining in that day were to be classified as "noncoal land." (Pet. App. 137a-139a.) Implementation of those regulations by USGS was expressly based on the view that coal lands were those where "coal can be commercially mined." 34TH ANNUAL REPORT OF THE DIRECTOR, USGS, TO THE SECRETARY OF THE INTERIOR 145-46 (1913). "[I]n determining whether a tract [was or was] not coal land the Department [was] guided by its coal classification regulations as to the workability of a deposit of coal occurring on such tract." *Nelson J. Littlejohn*, 44 Pub. Lands Dec. 48, 52 (1915).

In short, Congress reserved coal only on lands "valuable," 30 U.S.C. § 83, or even "chiefly" valuable for coal. 30 U.S.C. § 81. Congress knew that rights even to known deposits of hardrock coal would continue to pass to patentees under the 1909 and 1910 Acts, because those deposits were not valuable enough to be "chiefly valuable." *See, e.g., Ada I. Hindman*, 42 Pub. Lands Dec. at 329 (granting full patent without coal reservation despite ex parte affidavit from General Land Office "practical miner" that tract contained a "workable deposit" of coal). Congress did *not* follow a policy of reserving rights to coal of merely "indeterminate potential value." (Pet. App. 30a.) History, therefore, undermines the Tenth Circuit's inference that Congress intended to reserve rights to coal

bed methane which, at the time, appeared to lack even potential value.

II. THE PRESUMPTION IN FAVOR OF THE FEDERAL GRANTOR CANNOT BE MEANINGFULLY APPLIED TO DEFEAT HOMESTEADERS' CLAIMS TO COAL BED METHANE.

This Court has often cited the rule of construction that "land grants are construed favorably to the Government, that nothing passes except what is conveyed in clear language, and that if there are doubts they are resolved for the Government, not against it." *Watt v. Western Nuclear, Inc.*, 462 U.S. at 59 (quoting *United States v. Union Pacific R. Co.*, 353 U.S. 112, 116 (1957).) Because this rule is the centerpiece of the court of appeals' decision and of the respondents' arguments, its application must be carefully examined.

The only mineral mentioned in the 1909 and 1910 Acts is "coal." Gold, phosphate, oil, and natural gas, for example, are nowhere mentioned. Yet none contends that these minerals failed to pass to the patentee. Congress' failure to specifically exclude these minerals from the reservation of "coal" does not mean that they were not conveyed "in clear language." Closer to the point is the question of minerals interbedded with coal. If coal and uranium were interbedded in equal portions in lands patented under the Acts, would the reservation of coal alone be considered ambiguous, warranting resort to the presumption to treat uranium as "coal"? Closer still are the question of natural gas generated in strata deeper than the coal bed, but migrating up into it, and the question of natural gas generated in the coal bed, but migrating away from it. Is the term "coal" ambiguous as to one, the other, or both?

Used in isolation, as the court of appeals did here, the rule construing grants in favor of the government does not offer a principled way to answer these questions. Nothing in the long history of this rule of construction suggests it is equipped to handle the present situation in which Congress plainly grants one mineral, plainly reserves another, and is arguably silent about the result when the two are found together.

In American jurisprudence, the origin of the rule is traditionally attributed to the Charles River Bridge case, *Charles River Bridge v. Warren Bridge*, 36 U.S. 420 (1837). There the Court adopted English common law rules of construction of crown grants to determine whether the Commonwealth of Massachusetts had granted an exclusive bridge franchise. Because the corporate charter given to the proprietors of the bridge did not expressly convey an exclusive right, the court refused to imply it because any ambiguity must be construed in favor of the government. *Id.* at 544. *Charles River Bridge* is one among many cases invoking the rule of construction to defeat corporate claims of exemption from governmental powers. *See, e.g., Coosaw Mining Co. v. South Carolina*, 144 U.S. 550 (1892) (power of state to issue competing mining lease); *Minot v. Philadelphia, Wilmington & Baltimore RR Co.*, 85 U.S. 206 (1873) (tax power); *Holyoke Water-Power Co. v. Lyman*, 82 U.S. 500 (1873) (power to regulate fisheries). *Cf. The Binghamton Bridge*, 70 U.S. 51, 74 (1865) (despite rule of construction favoring government, words of grant must be given "liberal and fair construction").

The rule is easily applied in governmental power cases. Either the power is expressly waived, or it is not.

That is not the case here, for all agree that coal bed methane is a natural gas and all agree that (at least to a large extent) rights to natural gas are clearly conveyed by patents under the 1909 and 1910 Acts. Help on applying the rule, if it is to be gained at all, must come from this Court's mineral and land grant cases. Three are the most directly pertinent.

In *United States v. Union Pacific RR Co.*, 353 U.S. 112 (1957), the Court determined that the rule of construction denied the railroad the mineral rights underneath a right-of-way it had received "for the construction of a railroad and telegraph line." *Id.* at 113. The Court placed great weight on the statutory exclusion of "mineral lands" from the grant of adjoining lands to the railroad, finding it incongruous that the statute would exclude those lands but give the railroad "the untold riches underlying the right of way." *Id.* at 116. In contrast, under the 1909 and 1910 Acts Congress was careful not to deny patentees the rights to most minerals, reserving only the "coal" where the deposits were known to be valuable. Stated differently, Congress reserved the "told" riches – the coal; it was the "untold riches" that Congress granted to the patentee.

Andrus v. Charlestone Stone Products Co., Inc., 436 U.S. 604 (1978), draws closer to the problem at hand. There the issue was whether one could "locate" a claim to water under the Mining Law of 1972. That statute permitted claims as to "all valuable mineral deposits. . . . " 30 U.S.C. § 22. The issue was whether water is a "valuable mineral" under the statute. Standing alone, the rule of construction was of no help. The Court assumed that water was a

mineral. *Id.* at 610. Therefore, there was no facial ambiguity in the statute that would allow the Court to resolve doubts in the government's favor: the statute did not expressly mention water, but it did not expressly mention gold either. The Court had to resort to other lines of analysis, looking primarily to a brief history of the separate development of water rights law and of the Mining Law and its predecessors, *id.* at 611-14, and to "practical consequences" that would flow from holding water to be locatable. *Id.* at 614-16. The Court invoked the rule of construction only at the end of its opinion to summarize rather than amplify its conclusion.

Finally, *Watt v. Western Nuclear, Inc.* addressed the question of whether gravel found on lands patented under the Stock-Raising Homestead Act of 1916 was a mineral with the meaning of the statute's reservation of "all coal and other minerals." The majority determined that "mineral" was a term of many meanings; under some gravel was a mineral, under others it was not. 462 U.S. at 43. It also noted that the term had produced inconsistent rulings in cases where the issue concerned gravel. *Id.* at 44-45. If the rule of construction could properly be applied without further consideration of congressional intent, then the Court could have applied it at this point.

Instead, the Court conducted an extensive review of the history and purposes of the SRHA. Finding that Congress understood that the "surface of SRHA lands would be used for ranching and farming," the Court construed the term "minerals" to "include substances that are mineral in character . . . , that can be removed from the soil, . . . and that there is no reason to suppose were intended to be included in the surface estate." *Id.* at 53.

The present case, however, is at the opposite end of the interpretive spectrum from *Watt v. Western Nuclear, Inc.* The crucial difference in the cases is the differing contexts in which the SRHA and the 1909 and 1910 Acts were adopted, as this Court aptly explained. "Unlike the preceding statutes containing mineral reservations, the SRHA was not limited to lands classified as mineral in character, and it did not reserve only specifically identified minerals." *Id.* at 49. Because patents under the 1909 and 1910 Acts plainly included rights to natural gas, there is ample reason to suppose that drilling for natural gas, wherever it might be found, was intended to be included in the surface estate.

In sum, the rule of construction that ambiguities in grants are resolved in the government's favor cannot be applied as a substitute for the other lines of statutory analysis explained at length above. Those other lines, fully complementing the plain meaning of the term "coal," point in favor of the patentee. The only basis on which the respondents may rest their case is that the "practical consequences," *Andrus v. Charlestone Stone Products Co.*, 436 U.S. at 614, of holding for patentees militate against that conclusion, a point to which we now turn.

III. THE EFFECTS OF SEPARATE OWNERSHIP OF COAL AND COAL BED METHANE DO NOT COMPEL A DIFFERENT CONCLUSION.

In opposing Amoco's petition for a writ of certiorari, the United States urged that it was implausible "that Congress intended to give the agricultural patentee a useless commodity that would necessarily be dissipated when the coal owner removed the coal." The government

questioned whether Congress expected the courts to create a body of federal common law to address the incidental taking of a patentee's coal bed methane or require the payment of compensation for its waste. (U.S. Opp. at 27 n.12.)

This Court need not address whether the source of the common law is state or federal, but Congress explicitly contemplated a role for the courts in adjudicating disputes between patentees and coal operators.

> [N]o person shall enter upon said lands to prospect for, or mine and remove coal therefrom, without previous consent of the owner under such patent, except upon such conditions as to security for and payment of *all* damages to such owner caused thereby as may be determined by a court of competent jurisdiction.

35 Stat. 844 (codified at 30 U.S.C. § 81) (emphasis added). Damages to other minerals resulting from the coal owner's operations would appear to fall within the broad compensation provision of the 1909 Act.[5]

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[5] A textual comparison suggests Congress intended the compensation provisions in the 1909 Act to apply to more than just surface damage. This is demonstrated by the contrasting compensation provisions of the 1914 Agricultural Entry Act, which this Court construed as limiting compensation to damages for crops and agricultural improvements. *Kenney-Coastal Oil Co. v. Kieffer*, 277 U.S. 488, 505 (1928). The 1914 statute authorized qualified persons to enter lands containing reserved mineral deposits to prospect for such minerals upon the posting of a bond "as security for the payment of all damages to the crops and improvements on such lands by reason of such prospecting." 38 Stat. 509 (codified at 30 U.S.C. § 122). The 1910 Act's damages provision is essentially identical to that construed in *Kenney-Coastal*, 30 U.S.C. § 85, but broader language is used in the 1909 Act for mining and removal activities. 30 U.S.C. § 81.

It is unnecessary to address at this time whether a coal operator would owe the patentee damages for venting coal bed methane from a mine when the methane was worthless, or whether even valuable methane could be vented as a necessary incident of coal mining operations. What is clear is that Congress left these issues to courts of competent jurisdiction to resolve, and anxiety over how those questions might be answered has no bearing on the proper interpretation of the term "coal."

While it is certainly possible to produce coal bed methane without mining the coal, the government's point is that it is not possible to mine coal without releasing coal bed methane. This circumstance, however, has not prevented Congress from dividing rights to minerals. In an analogous situation, Congress has reserved the "ownership of and the right to extract helium" from all gas produced under federal onshore and offshore oil and gas leases. 30 U.S.C. § 181 (Mineral Leasing Act); 43 U.S.C. § 1341(f) (Outer Continental Shelf Lands Act). "Natural gas" is a commingling of hydrocarbons, such as methane, and nonhydrocarbons, such as helium. *Northern Natural Gas Co. v. Grounds*, 441 F.2d 704, 708 (10th Cir. 1971). When natural gas is extracted from the reservoir, it contains all of its constituent elements, including helium. *Id.* The federal lessee cannot produce natural gas without producing the helium belonging to the United States. The solution to this apparent dilemma has been covered by regulation for years. At the United States' election, the lessee may be required to deliver the helium-containing gas to a processing plant for extraction. *See* 30 C.F.R. § 256.11. Yet under the government's logic, this circumstance would be a ground for barring the severance of the helium from the methane. That Congress is unimpressed

by this logic is ample reason for the Court to reject it as well.

The respondent Southern Ute Tribe has offered a similar prudential concern. In its opposition, the Tribe argued that Congress could not have intended to give patentees dominion and control over a substance that cannot be extracted without destroying the coal. (Southern Ute Opp. at 25.) Strictly speaking, the coal is not "destroyed" in the sense that it has no value as a result of coal bed methane extraction. Indeed, the Tribe's expert testimony indicates that the harm, if any, is contingent upon a coal lessee being actively engaged in mining operations.

> Coal miners normally consider fractures of the coal seam or adjacent structures to have a negative impact on coal production. A fractured roof, floor and/or seam generally translates into additional operating costs, loss of productivity and increased safety hazards in coal mining. In addition, the introduction of substances (i.e., gels, sands, etc.) into a coal seam to be mined creates problems for the coal producer who is concerned about the quality of the product.

(J.A., Vol. I at 324.) Whether the coal is in fact damaged by coal bed methane extraction is a matter of dispute.

As a practical matter however, the real issue is not whether Amoco's interpretation of "coal" will allow the coal seam to be damaged but rather who is entitled to inflict that damage. Many coal operators also produce the coal bed methane from the non-federal seams they mine, as observed by another of the Tribe's experts:

> Coal seam gas production has been successfully undertaken in association with active mining operations (before, during, and after mining), as

> well as in "virgin" coal seams where no active mining has yet taken place. It is the goal of coal seam degasification projects to produce gas at rates and volumes that render it economically competitive with other sources of natural gas. When done as part of an active mining operation, this process reduces the waste of hydrocarbon gases that would normally be liberated during mining.

(J.A., Vol. I at 350.)

As for congressional intent in 1909 and 1910, split estate mineral development was common, and it was known that production by one mineral owner might harm the mineral he did not own.[6] As early as 1893, the Supreme Court of Pennsylvania determined that an oil and gas lessee had the right to drill through the coal estate of another though he might be liable to the coal owner for damages. *Chartiers Block Coal Co. v. Mellon*, 25 A. 597 (Penn. 1893). In that case the surface owner did not expressly reserve any rights to conduct oil and gas operations through the coal seam when he conveyed the coal estate. Years later, he entered leases for the oil and gas underlying the coal. Seeking to accommodate the rights of both mineral owners, the court denied the coal owner's request for an injunction and held that

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[6] *See, e.g., South Penn Coal Co. v. Smith*, 60 S.E. 593 (W. Va. 1908) (deed conveying coal reserved to grantor right to drill for oil and gas); *Chambers v. Smith*, 38 A. 522 (Pa. 1897) (same); *Rend v. Venture Oil Co.*, 48 F. 248 (W.D. Penn. 1891) (court refused to grant injunction where coal owner alleged drilling for oil and gas would interfere with removal of the coal). The concurring judge in *Chartiers Block Coal Co. v. Mellon*, 25 A. 597 (Penn. 1893), discussed in the text, observed that of 60,000 existing oil wells in Pennsylvania, half were drilled through workable coal seams. (*Id.* at 601 (concurring opinion).)

> [t]he owner of the coal must so enjoy his own rights as not to interfere with the lawful exercise of the rights of others who may own the estate, either above or below him. The right of the surface owner to reach his estate below the coal exists at all times. The exercise of it may be more difficult at some times than at others, and attended with both trouble and expense.

Id. at 599.

Finally, neither the Department of the Interior nor the Tenth Circuit considered damage to the coal seam germane to the question of rights to coal bed methane. In the 1990 Solicitor's opinion, the Department recognized that "[c]oalbed gas extraction techniques may, in some cases, damage the coal seam and render the coal unminable or more expensive to mine. . . . " (Pet. App. 175a.) Notwithstanding this observation, the Solicitor concluded that a lessee under a conventional oil and gas lease was entitled to extract methane from the coalbeds located on its lease. (*Id.* at 167a.) The Tenth Circuit did not disagree, but instead "accept[ed] that an oil and gas lease executed by the owner of CBM [coal bed methane], in the absence of a specific reservation of CBM, could be an effective instrument to convey the right to drill and produce CBM." (Pet. App. 79a-80a n.19.)

In sum, the severance of rights to coal bed methane from rights to the coal create no greater practical difficulties than those Congress was already aware of in 1909 from the practice of severing rights to coal from rights to oil and gas.

CONCLUSION

The judgment of the court of appeals should be reversed.

Respectfully submitted,

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APPENDIX A – IDENTIFICATION OF INTERESTED PARTIES

The members of the Coal Bed Methane Ad Hoc Committee are as follows:

Karen Kennedy, Chairman (WIPA)
Barrett Resources, Inc. (Joe Barrett)
John Daly
Devon Energy Corporation (Gary McGee)
JoAnn Homer
Independent Petroleum Association of America (Ben Dillon)
Jolen Operating Company (David Fleischaker)
Bryon Oedekoven
Fred Oedekoven
Joel Ohman
Jack Overstreet
Penneco Resources
Petroleum Association of Wyoming (Rick Robitaille)
Prima Oil and Gas Company (Walter Lunsford)
Redstone Resources, Inc. (Mike Caskey)
Hap Stuart
Tom Throne
Western Gas Resources, Inc. (Krista Mutch)
Wyoming State Senator Steve Youngbauer

Persons or companies financially supporting the Coal Bed Methane Ad Hoc Committee are as follows:

Thomas Barlow
Bear Paw Energy
Ray Broyles
Nancy Butcher
Wilma Carter
Chandler & Associates
Citation Oil & Gas
CMS Oil & Gas Company

Colorado Interstate Gas Company
Ola Criffield
Dossett & Dossett
Duncan Energy Company
Farleigh Oil Properties, Inc.
First Interstate Bank, Gillette, WY
C.F. Goddwin
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J.N. Exploration
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Sandra Lange
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Mad House, Inc.
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Frances Putnam
Rawhide Resources
RIM Operating Company
Larry Stuart
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Torch Energy
Yates Petroleum Corporation

Supreme Court, U.S.
FILED
APR 2 1999
CLERK

No. 98-830

IN THE
Supreme Court of the United States
OCTOBER TERM, 1998

AMOCO PRODUCTION COMPANY, *et al.*,
Petitioners,

v.

SOUTHERN UTE INDIAN TRIBE,
Respondent.

On Writ of Certiorari to the United States Court of Appeals for the Tenth Circuit

---

BRIEF OF *AMICUS CURIAE* NATIONAL MINING ASSOCIATION IN SUPPORT OF RESPONDENT

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IN THE

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On Writ of Certiorari to the United States Court of Appeals for the Tenth Circuit

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BRIEF OF *AMICUS CURIAE* NATIONAL MINING ASSOCIATION IN SUPPORT OF RESPONDENT

INTEREST OF *AMICUS CURIAE*

The National Mining Association ("Association")[1] is a trade association representing producers of most of America's coal, metals, and industrial and agricultural minerals.[2]

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[1] The National Mining Association was established in 1995 through the combination of the two longstanding trade associations of the mining industry—the American Mining Congress founded in 1897 and the National Coal Association founded in 1917.

[2] Counsel for the parties have consented to the filing of this *amicus* brief. Their letters of consent have been filed with the Clerk of the Court. No party or its counsel has authored any part of the Asso-

Its membership also includes manufacturers of mining and mineral processing machinery and supplies, transportation, financial and engineering firms, and other businesses related to mining. The Association's membership includes the producers of more than 70% of the coal mined in the Nation, many of which operate coal mines, or lease coal reserves, on public lands including lands where the United States reserved the coal deposits under the 1909 and 1910 Coal Lands Acts, 30 U.S.C. §§ 81 & 83-85.

The principal purpose of *Amicus* is to represent those with interests in the Nation's mineral resources industries in the important public policy issues affecting the development and use of mineral resources. Toward this end, *Amicus* seeks to develop policies that will foster the efficient production, distribution and use of mineral products.

Coal has served as the backbone of our Nation's industrial and economic expansion. Coal is the primary source of energy produced domestically. See Energy Information Administration, *Monthly Energy Review*, February 1999 at 5. It provides the source of fuel for the generation of more than 50% of the electricity consumed in this country. *Id.* at 95. Coal also supplies the source of coke for the iron, steel and other industries, and the carbonization process for converting coal to coke yields coal gases for heating and coal chemicals for manufacturing diverse products including solvents, medicines, dyes and plastics. See generally Energy Information Administration, *Coal Data: A Reference* 30-36 (1995) ("*Coal Data*"). Because it is an important source of energy and raw material, coal reaches almost every phase of our national daily life and well-being.

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ciation's brief. No person or entity other than the Association and its counsel has made a monetary contribution to the preparation or submission of this brief.

Coal deposits are located in 38 states, and over 1 billion tons are mined annually from mines in 25 states. Energy Information Administration, *Coal Industry Annual* 4 (1998). More than one-third of the annual production occurs on lands where the coal and mining rights are secured through leases with the United States and Indian tribes. *Id.* at 21. Safe and productive coal mines depend upon dominion and control over the coal resource and mining conditions. As it stands, the decision below avoids the grave consequences that would follow if legal title and control over the coal resource were split between parties who do not share the same interest in the purpose and manner in which it is to be exploited.

BACKGROUND

A. The Origin and Composition of Coal.

Coals originated from the luxurious vegetation produced from the sun's heat in early geological times. Immense trees and ferns were piled upon another in circumstances which prevented the free access of air. At various intervals, wind and water covered this mass of plant debris with sediment, sand and dirt to form the overburden materials now found above coal deposits. Over millions of years, these layers of vegetative material were subjected to moisture, heat and pressure and, through a biochemical and geochemical process commonly known as "coalification", cellulose and other organic material decreased in moisture and increased in carbon content. See Richard Neavall, *Origin, Petrography and Classification of Coal, in Chemistry of Coal Utilization* 92-95 (Martin Elliot ed., 2d Supp. Vol. 1981). In this manner, vegetation was converted progressively to peat, lignite, sub-bituminous and bituminous coals, and finally to anthracite. See American Society for Testing and Materials, *Designation: 388 Stand-*

ard Classification of Coals By Rank (1998) (classifying coals according to degree of metamorphic alteration).

The characterization of coal as a "combustible rock" is, at best, an oversimplification. Superficially, coal appears to be a solid material; however, its composition and structure are much more complex. The physical structure of coal has been described as a solid colloid, in other words, "a solid dispersion of porous particles". Ann G. Kim & F.N. Kissel, *Methane Formation in Coalbeds, in* Department of the Interior, *Methane Control Research: Summary of Results, 1964-1980* 23 (Bureau of Mines Bulletin 687, Maurice Deul & Ann G. Kim eds., 1988) (*"Methane Control Research"*). Coal has been also likened to a fruitcake inasmuch as it is "formed initially as a mixture of diverse ingredients that are then altered (metamorphosed) in a natural baking process leading to a final product that is visibly heterogenous." Neavall, *supra,* at 93. The principal ingredients are organic material (macerals), mineral matter, and water and gases in submicroscopic pores. *Id.* at 92. During the coalification process, first oxygen and then hydrogen evolve from the "carbon backbone" as low molecular weight substances such as carbon dioxide, water and methane. *Id.* at 96.

Methane (CH_4) is the smallest of these organic molecules in coal. Because coal is extremely porous with a very large internal surface area, methane molecules are adsorbed, or fixed, within coal's extensive network of micropores. Unlike free methane, found in fractures and cavities in rock, methane in coal is primarily adsorbed as a monomolecular layer on the internal surface of these micropores. See Kim & Kissel, *supra,* at 22; Herbert Black, *Update on U.S. Coalbed Methane Production, in* Energy Information Administration, *Natural Gas Monthly,*

October 1990 at 4.[3] The release, or desorption, of methane from coal's microstructure occurs when pressure in the coal seam drops, for example, through the mining or drilling into the coal. International Energy Agency Coal Research, *Methane Emissions from Coal* 8 (November 1992); Maurice Deul & Ann G. Kim, *Methane in Coal: From Liability to Asset,* 61 Mining Congress J. 28-29 (November 1975).

These and other unique physical characteristics of coal distinguish it from the gas bearing rocks, or reservoirs, that contain hydrocarbon gas and liquids. While the composition of coal is 90 percent organic, conventional gas-bearing rocks are almost completely inorganic. Jacki L. Kelly, *Coalbed Methane: From Nuisance to New Source,* 12 Gas Research Institute Digest 6 (Summer 1989). Coal does not store methane like the typical natural gas reservoirs where gas is held "freely" in the pores of the inorganic rock. Instead, most of the methane in coal is molecularly bound in the coal. *Id.*; Kim & Kissel, *supra,* at 22.

B. Coal Mining and Methane.

Coal is extracted from beds or seams primarily by either surface or underground mining methods. Whenever coal is mined, the pressure in coal is lowered and the adsorbed methane is liberated to the atmosphere or mine workings. In general, larger amounts of methane are associated with underground mines because the deeper coals

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3 Presssure and, to a lesser degree, temperature are the principal factors that control the quantity of methane adsorbed in the coal. As pressure increases (and coal rank increases) so does coal's capacity to adsorb methane. Kim & Kissel, *supra* at 22. Because the coalification process results in the formation of more methane than the coal can adsorb, the excess migrates to the surrounding rock strata. International Energy Agency Coal Research, *Methane Emissions from Coal* 6-7 (November 1992).

are held under greater pressure and can hold more methane. Much of the methane in coal is released only when coal is broken, and the finer, or smaller, the pieces produced during mining, the greater the rate of methane liberation. Society of Mining Engineers, *Mining Engineering Handbook* § 3.15.4 (Ivan A. Given ed., 1973); National Research Council, *Toward Safer Underground Mines* 33 (1982).

Methane, when combined with certain proportions of air, is explosive. *Mining Engineering Handbook, supra* (explosive methane concentrations range between 5%-15%, but ignitions can occur below 5% and as high as 20%). It is also the trigger for the more violent dust explosions that have cost countless lives in the coal mines. *Id.* To control this hazard, mine operations ventilate the mine workings in order to dilute, render harmless and sweep the mine of poisonous and explosive gases released in varying degrees by the coal seams as they are mined. Ventilation is essentially a method of producing, conducting and distributing a constant current of fresh air through the mine workings and returning the impure air to the outside atmosphere. Jed H. Mosgrove, *Ventilation and Dust Control, in Elements of Practical Coal Mining* 206 (Samuel M. Cassidy ed., 1973). Effective ventilation methods include the use of high-pressure surface fans with properly laid-out and unobstructed air courses as part of the mine plan design. *Id.* As deeper and gasier coal seams are mined, operations may supplement these ventilation methods with methane drainage (or degasification) techniques in advance of mining. See Deul & Kim, *Methane in Coal, supra,* at 28.

Coal miners have long associated unwholesome and lethal gases with coal. Maurice Deul & Ann G. Kim, *Research in Methane Control, in Methane Control Research,*

supra, at 3 ("The presence of these gases were noted toward the end of the 16th century"). Although early miners lacked the means to detect the composition of the gas mixtures they encountered, they formulated their own descriptive terminology that reflected the effect these gases had upon themselves and their working environment. "Firedamp" described methane mixtures that would burn or explode. "Chokedamp" or "blackdamp" described conditions when gas mixtures displaced oxygen so as to extinguish the miner's lamp and cause suffocation. Jed H. Mosgrove, *Mine Gases, in Elements of Practical Coal Mining* 187 (Samuel M. Cassidy ed., 1973).[4]

As coal miners began to extract coals found further below the surface, the lethal nature of methane took a deeper toll. It is reported that severe methane explosions occurred with greater frequency in British mines early in the 18th century. Deul & Kim, *Research in Methane Control, supra,* at 3; see also Everett M. White, *Fires and Explosions, in Elements of Practical Coal Mining* 227 (Samuel M. Cassidy ed., 1973). The first reported coal mine explosion in the United States occurred near Richmond, Virginia in 1810, and mine explosions occurred with increasing frequency in the coalfields after 1875. H.B. Humphrey, *Historical Summary of Coal Mine Explosions in the United States* 3-5 (Bureau of Mines Information Circular 7900, 1959); Deul & Kim, *Research in Methane Control, supra.*

The coal mining states began to enact coal mine safety legislation in the latter part of the 19th century. National Research Council, *supra,* at 51. Most of these state laws included some form of minimum ventilation requirements to dilute methane and other gas concentrations. *Id.* The same concerns for the well-being of coal miners in the

[4] The reference to "damps" for these gases may have been derived from the German word "dampf", meaning gases or vapors. *Id.*

Territories apparently spurred Congress to enact the first federal coal mine safety law in 1891. Territorial Mine Inspection Act, Act of March 3, 1891, ch. 564, 26 Stat. 1104. The Act directed that the coal mine inspector appointed in each Territory inspect and report on the conditions of the coal mines to the Secretary of the Interior and the governor of the Territory. *Id.* § 3, 26 Stat. 1104-05. The Act also prescribed specific ventilation standards for any coal mine at a depth of one-hundred feet or more "so as to dilute and render harmless . . . the noxious or poisonous gases." *Id.* § 6, 26 Stat. 1105.

Coal mine safety remains the subject of comprehensive federal regulation under a law that continues to place special emphasis on the detection and control of methane. Federal Mine Safety and Health Act ("Mine Safety Act"), 30 U.S.C. § 863 (*e.g.*, continuous operation of mechanical surface fans for ventilation; minimum air velocity and maximum methane concentrations; pre-shift, daily and weekly methane examinations; methane monitors and detection devices; automatic deenergizing of equipment and evacuation when methane concentrations exceed 1.5%). The omnipresent danger posed by methane to coal miners is no less serious today than a century ago. According to the Bureau of Mines, "[e]ven before 1890, the causes of explosions were known and rudimentary methods for reducing hazards were available." Deul & Kim, *Research in Methane Control, supra,* at 3. Today, improvements in technology to detect and control methane concentrations and the stricter standards prescribed by law have greatly reduced (but not eliminated) the frequency of these tragedies as well as the human toll they exact. See Humphrey, *supra,* at 21 (reporting almost 400 deaths annually between 1901-1910 from coal mine explosions): Mine Safety Health Administration, *Mine Injury and Worktime Quarterly* 18 (Closeout ed. 1997) (no deaths but 10 injuries from gas or dust explosions in 1997).

C. The Commercial Extraction of Methane from Coal.

Although the presence of methane in coal has been known for centuries, its "commercial discovery" is of most recent vintage. The combination of dwindling gas reserves and new tax credits for non-conventional fuels stimulated interest in the commercial exploitation of what has always been considered a hazardous burden of the coal estate. See Herbert T. Black, *U.S. Coalbed Methane Production, in* Energy Information Administration, *Natural Gas Monthly,* January 1994, at 1.

Since the object of commercial extraction of methane from coal is not the free gas associated with the surrounding rock strata, but rather, the methane molecularly bound in the coal, the extraction methods target and complete a well in the coal deposit. See Kelly, *supra,* at 6-8; Black, *Update on U.S. Coalbed Methane Production, supra,* at 4. In what is referred to as an "open hole" completion, a vertical borehole is drilled and cased above the coalbed, and the borehole is then extended into the coal. The borehole opening changes the equilibrium of the coalbed by reducing the pressure which causes the methane to desorb from the coal. M. A. Trevits et al., *Methane Drainage Through Small-Diameter Vertical Boreholes, in Methane Control Research, supra,* at 106.[5]

In many coals, the open-hole technique will not yield sufficient methane. In order to increase the rate of desorption, stimulation techniques are used to artificially induce further physical changes in the coal. See *Legal*

[5] Because coal is porous, and the pores are saturated with water, water is pumped continuously to reduce the pressure and release the methane from the coal. *See* Kelly, *supra,* at 6.

Environmental Assistance Foundation, Inc. v. U.S. Env't. Protection Agency, 118 F. 3d 1467, 1470-71 (11th Cir. 1997) (coalbeds must be fractured to induce a significant flow of gas). The most frequently used stimulation technique is known as hydrofracturing (or "fracing"), and involves the injection of fluids under pressure to increase the permeability of the coal and increase the coal's surface areas to allow the methane to desorb. Suspended solids, such as sand, are added to the fluid as a propping agent in order to hold open the fractures created by the fluid injection. Trevits, *supra*, at 110; Deul & Kim, *Methane in Coal, supra*, at 29.

SUMMARY OF ARGUMENT

In determining whether a substance is included in the surface estate or mineral estate under public land laws, this Court looks to the use of the surface estate that Congress contemplated and the purpose of the mineral reservation. In opening coal lands to settlement under the 1909 and 1910 Acts, Congress plainly expected that the surface would be used by settlers for agricultural purposes. At the same time, Congress desired to retain control over all coal in these lands for future disposition and development in accordance with our nation's economic needs. Indeed, it is a testament to Congress' foresight that public lands today are the source of one-third of our nation's annual coal production.

The competing claims here involve coalbed methane, a substance that is molecularly bound in coal and liberated when coal is mined. When Congress provided for the agricultural entry and settlement of coal lands, it was already well aware that the coal it reserved included coalbed gases such as methane. Before the turn of the century, Congress enacted a mine safety law to protect miners working the coal in the Territories from the dangerous propensities of

methane and other gases in coal. Shortly before the opening of coal lands to settlement, Congress authorized the first federal research and investigation into controlling this lethal menace to coal miners.

The decision of the court of appeals that coalbed methane adsorbed in the coal is part of the coal reservation is faithful to the purposes underlying the Acts. Insofar as the purpose of the reservation, the decision demonstrates fidelity to Congress' desire to retain all control over the future disposition and development of the coal deposits. It also reflects Congress' plain expectation that homesteaders would not have any competing need or interest in targeting the same resource for commercial exploitation. As history amply proves, there is simply no need to infer that Congress intended to convey title to a constituent of the reserved coal in order to effectuate the purpose of the grant to open the surface of coal lands to agricultural settlement.

Finally, an interpretation different than the one reached by the court of appeals would be enormously impractical. It is unreasonable to suppose that Congress intended to convey an interest in a constituent of coal that it knew existed and would be destroyed when the coal was mined. Moreover, Congress plainly did not intend to burden the reservation in a manner that makes the exploitation of the coal dependent upon the initiative of surface patentees whose interests lie elsewhere. The suggestion that the accommodation doctrine permits such an interpretation is without merit. The accommodation doctrine is not an interpretative aid for ascertaining Congress' intent as to the subject matter of the grant and reservation. Nor can the doctrine sanction an interpretation that would so seriously subvert the purpose of the coal reservation. The judgment below should be affirmed.

ARGUMENT

I. THE RESERVATION OF ALL COAL AND THE RIGHT TO PROSPECT, MINE AND REMOVE IT INCLUDES METHANE TRAPPED IN THE COAL

The source of the controversy here arises from the disposition of public lands under land-grant statutes that departed from the historic system of land classification and, instead, provided for the severance of the surface and minerals. See *Watt v. Western Nuclear, Inc.*, 462 U.S. 36, 47-49 (1983). As it was, the disposition of public lands under the land classification system depended upon their classification as either mineral land or non-mineral land and fee simple title conveyed for the entire land on that basis. *Id.* at 47. Dissatisfaction with this system, largely due to the misclassification of coal lands as non-mineral lands, resulted in series of enactments that shifted the disposition of the public lands from a system of classification to system of mineral reservation. *Id.* at 48-49.

The 1909 and 1910 Coal Lands Acts were the first of those public land statutes whereby an entryman takes title to the surface subject to a reservation of minerals. Act of March 3, 1909, ch. 270, 35 Stat. 844 ("1909 Act"); Act of June 22, 1910, ch. 318, 36 Stat. 583 ("1910 Act") (together the "Acts"). Although, at the time, this new system was novel for the disposal of lands in the public domain, the severance of surface and minerals was already a well-established doctrine of the common law in this country. 3 *Lindley on Mines* § 812 (3d ed. 1914). Accordingly, competing claims, as the ones here, that follow from a mineral reservation enacted by public land grant statutes are not unlike those that arise where the severance is effected by a private conveyance as such. The essential inquiry in interpreting either a public or private grant or reservation focuses upon the

purpose and intent of the grantor. Compare *Western Nuclear*, 462 U.S. at 52 (the determination of what is included in the surface estate or mineral estate made in light of the use of the surface estate that Congress contemplated) with *Vines v. McKenzie Methane Corporation*, 619 So. 2d 1305, 1307 (Ala. 1993) (meaning of the term minerals is not to be determined by rigid definitions, but from language of the grant or reservation, surrounding circumstances, and intent of grantor); *Hartman v. Potter*, 596 P.2d 653, 656 (Utah 1979) (the main object in construing a severance deed is to ascertain intent, especially that of the grantor). The court of appeals' conclusion that methane trapped, or adsorbed, in coal is included in the reservation of "all coal" in the 1909 and 1910 Acts rests firmly on this well-established principle. Pet. App. 14a-15a.

A. The Purpose of the Surface Grant.

Before 1909, the public land laws prohibited agricultural settlement of lands designated as valuable for coal. 1 *American Law of Mining* § 22.01 (2d ed. 1998); Robert W. Swenson, *Legal Aspects of Mineral Resources Exploitation, in* Paul W. Gates, *History of Public Land Law Development* 724 (1968). Despite these restrictions on the preemption of public lands under the homestead laws, vast tracts of federal coal lands were transferred into private ownership as a result of misclassification from either mistake or fraud. *Western Nuclear*, 468 U.S. at 48 n.9; Swenson, *supra*, at 726. Serious concerns with both the efficacy of the existing coal entry laws to support commercial coal development and the loss of federal control over vast tracts of federal coal resources necessary for the nation's future economic vitality prompted a series of executive withdrawals of coal lands commencing in 1906. Swenson, *supra*, at 726-27.

These events caused hardships for agricultural entrymen who had already settled on lands that were later reclassified as coal lands, and thwarted prospective settlement as well. To accommodate the interests in making surface lands available for settlement while preserving federal control over the coal resources vital to the nation's economic well-being, Congress reopened the withdrawn lands to agricultural settlement subject to a reservation of all coal. To address the plight of the agricultural entryman who in good faith settled on lands that were later reclassified or withdrawn, Congress provided in the 1909 Coal Lands Act that the entryman might nevertheless receive a limited patent to the surface. 35 Stat. 844 (currently codified at 30 U.S.C. § 81). The following year, Congress, through the 1910 Coal Lands Act, opened all of the classified and withdrawn coal lands to entry under the homestead laws and allowed "actual settlers" to receive limited patents to the surface land. 36 Stat. 583 (currently codified at 30 U.S. §§ 83-85). In each case, the Acts reserved to the United States all the coal in the lands and "the right to prospect for, mine and remove the same." 30 U.S.C. §§ 81, 83.

The purpose of embarking upon this new system of severance of the surface estate and mineral estate was to open coal lands to settlement and cultivation, but retain federal control over all coal deposits for future disposition and development. 6 *American Law of Mining* § 200.02[2][B] (2d ed. 1998). The purpose of the grant is readily apparent from the titles of the Acts and the language that defines the attendant privileges. First, as the court of appeals found, the title of the 1910 Act clearly explicates that its purpose was "[t]o provide for agricultural entries on coal lands." Pet. App. 16a (quoting 36 Stat. 583). The title of the 1909 Act likewise informs that its purpose

was the "protection of the surface rights", 35 Stat. 844, of those persons who in "good faith . . . entered under the nonmineral land laws," *id.* The titles of both Acts demonstrate that Congress plainly expected that the limited grants of surface land would be used for cultivation.

Second, this understanding is further confirmed by the privilege provided by the Acts for settlers to use the reserved coal deposits—a privilege limited in its purpose and duration. In both laws, Congress allowed settlers to use the coal for on-site, domestic purposes prior to disposal of the coal deposits (initial proviso of 1909 Act; initial proviso of 1910 Act, § 3). As Petitioners would have it, this limited privilege to use the coal deposits would extend until all the coal is mined and carried away. To accept Petitioner's view would in effect be saying that their rights to the coal deposits are coextensive in terms of duration and purpose as the successors to the United States' reservation of all the coal.

The Court should decline the Petitioners' invitation to construe the limited grant "so as produce a result so at odds with the purposes underlying the statute[s]." *Western Nuclear*, 462 U.S. at 56. Certainly, as history amply proves, there is no need to infer that Congress intended to convey title to a constituent of the coal in order to effectuate the purpose of the grant to open the surface of coal lands to agricultural settlement. The same, however, cannot be said with respect to the purpose of the broad reservation of all coal in the lands. As we explain below, the passage of title by implication of a constituent of the coal presents irreconcilable conflicts that thwart the safe, orderly, and economic development of the reserved coal estate. If the bounds of the grant are defined by reference to man's ingenuity to extract constituents from the reserved resource, then the United States and its successors

must wonder what sort of estate the United States actually reserved.

B. The Nature and Scope of the Coal Reservation.

When Congress reserved coal in lands opened to agricultural settlement in the 1909 and 1910 Acts, it used expansive language. The reservation goes to "all coal in said lands, and the right to prospect for, mine and remove the same" as well. 30 U.S.C. §§ 81, 83. Congress' purpose in reserving all coal was to preserve these essential resources for commercial development by those "persons interested in exploiting them", not agricultural entrymen "whose interests were known to lie elsewhere." *Western Nuclear*, 462 U.S. at 47, 56.

It may be true, as Petitioners assert (Pet. Br. 25-26), that the Department of the Interior classified the lands in question on the basis of whether they were "valuable" or "chiefly valuable" for coal. But the manner in which the Department classified the lands is simply beside the point, and does not inform the scope of the reservation. Once the lands were so classified, all coal was reserved to the United States—not merely the "valuable or chiefly valuable" parts or substances that comprise coal. Nothing in the Acts or their history suggest anything less than what the reservation plainly says. See 45 Cong. Rec. 6154 (1910) ("[W]e do not intend that an entryman for agricultural purposes shall acquire *any right whatever in coal* under the surface of the ground he settles upon . . .") (emphasis supplied).

Congress certainly knew well before 1909 that coal contained gases and other substances that were liberated when the coal was mined. The coal miners' lethal encounters with methane and other gases in coal had already received considerable congressional attention. Before the

turn of the century, Congress enacted a safety law "for the protection of the lives of miners" working the coal in the very lands later subject to the 1909 and 1910 Acts. Territorial Mine Inspection Act, Act of March 3, 1891, ch. 564, 26 Stat. 1104. One of the principal objects of that measure was to ensure adequate ventilation through mechanical means for "every coal mine . . . so as to dilute and render harmless and expel therefrom the noxious and poisonous gases." *Id.* § 6, 26 Stat. 1105. In 1908, soon after 1,148 miners perished in a succession of violent coal mine explosions, Congress authorized the first federal investigation and research into the mode of occurrence and the means to control the menace posed by methane and other coalbed gases. Humphrey, *supra*, at iii, 33. See also Rollin T. Chamberlin, *Notes on Explosive Mine Gases and Dust* 5 (U.S.G.S. Bulletin 383, 1909).

When examined in this historical context, the gloss Petitioners place on the legislative history of the 1910 Act takes on a different hue. According to Petitioners (Pet. Br. 30), Congress' intent to liberate the adsorbed gas in coal from the reservation is confirmed by Representative Mondell's resistence to a broader reservation that would include natural gas. The reason for eschewing this broader reservation, Mondell explained, was because the presence of coal "is [so] apparent . . . that it is not difficult to determine approximately the probable extent and area of coal lands, [but] [g]as is found here and there." 45 Cong. Rec. 6044 (May 10, 1910). It is precisely this elusive nature of natural gas ("found here and there"), however, that distinguishes it from coalbed gas. Congress was well aware at the time that methane is "always there" in the coal that it reserved.

The intent the court of appeals gleaned from the Acts and their history as to the scope of the coal reservation

is the one that best serves the congressional purpose. As Petitioners acknowledge, the purpose of the coal reservation was "to secure federal control of that mineral." Pet. Br. 20. See also 6 *American Law of Mining* § 200.02 [2][B] (2d ed. 1998) (reservation "preserved federal control of the coal resources which might exist in the lands"). Yet, the very control the coal reservation so plainly intends is lost under Petitioners' construction which cedes to the surface patentee extraction rights to substances that comprise the coal itself. See Pet. Br. 27 n.15 (reservation of the specific mineral coal in 1909 and 1910 Acts does not include other substances that might be found in coal including methane, water, and carbon dioxide).

The most critical aspect of a grant or reservation in the coal estate is the possession dominion and control over it in order to mine and remove the coal. Without that, the reservation is destroyed. See *Williams v. Gibson*, 4 So. 350, 353-54 (Fla. 1888) (to construe away the right to possess and mine the coal estate is to construe away the grant itself). See also *Lillibridge v. Lackawana Coal Co.*, 22 A. 1035, 1037 (Pa. 1891) (ownership of the coal estate includes the space it occupies). Coalbed gas is physically bound (adsorbed) in the coal and released in the mining process. Chamberlin, *supra*, at 16-17; Kim & Kissel, *supra*, at 23. Because of its explosive and poisonous properties, mine operations must, as a matter of necessity and law, monitor, control and ventilate coalbed gas at all times to avoid explosions and asphyxiation. See Mine Safety Act § 303, 30 U.S.C. § 863. Adequate ventilation "is the most important single phase of mining, one [on] which everything else depends; [and w]ithout [it] no operations are possible." Mosgrove, *supra*, at 207.

As is readily apparent from the nature of both the coal resource and the methods for removing it (whether in 1909 or today), the coal cannot be exploited for its re-

served purpose without the release and expulsion of its methane constituents which Petitioners assert are part of their grant. Indeed, if the grants include methane absorbed within the coal, then, as Petitioners' amici suggest (CBM Ad-Hoc Comm. Br. 25-26), the exploitation of the coal reservation will be followed by compensatory claims for the waste or use of the liberated gas. Postponement or abandonment of mining until surface patentees or their successors commercially extract the methane from the coal is equally subversive to the purpose of the reservation. Such a result "would make the exploitation of the [coal] deposits dependent solely upon the initiative of persons whose interest [a]re known to lie elsewhere." *Western Nuclear*, 462 U.S. at 56. In either case, the reserved coal estate would become servient to the surface grant, a result Congress plainly did not intend. See *Kinney-Coastal Oil Co. v. Kieffer*, 277 U.S. 488, 504 (1928) (a mineral reservation imposes a servitude on the surface estate so that United States may realize a proper return from extraction of the mineral).

The court of appeals' conclusion that adsorbed coalbed methane is part of the reservation of all coal is faithful to the purposes underlying the Act to retain all interests in the coal for subsequent development as well as Congress' expectation that the surface grant would be used by homesteaders who would have no competing need or interest in targeting the same resource for commercial exploitation. Aside from a commercial interest that emerged only once this hazardous component of coal took on a valuable economic quality, Petitioners cannot point to any need for its use remotely associated with the purpose of the grant to open coal lands for agricultural settlement. Of course, as the court of appeals found (Pet. App. 31a), the discovery of value of a component of the reserved mineral does not expand the grant. To conclude otherwise

requires one to infer that Congress intended to make a grant which would gravely diminish, if not destroy, the property and rights it had reserved.

II. THE ACCOMMODATION DOCTRINE CANNOT SUBSTITUTE FOR THE INTENT OF THE GRANTOR

The interpretation of the grant advanced by Petitioners evinces plain infidelity to its purpose. This alone is sufficient to warrant its rejection. In addition, their interpretation is enormously impractical which further verifies that it would defeat Congress' intent.

Coal is an aggregate of physically distinct and chemically different organic and mineral substances with water and gases contained in its submicroscopic pores. See Neavall, *supra*, at 92-93. As a legal and practical matter, a grant or reservation in coal creates an estate in the entire coal deposit. Rather than "deal[] with a practical subject in a practical way," *Burke v. Southern Pac. R.R. Co.*, 244 U.S. 669, 679 (1914), as Congress did, Petitioners reject any readily identifiable bound between the coal and surface estates. Compare 30 U.S.C. § 81 ("The coal deposits in such land shall be subject to disposal by the United States . . ."), and *id.* § 85 (same) with Pet. Br. 27 n.15 (asserting that specific reservation of coal does not include other substances in coal such as methane, water and carbon dioxide). Instead, Petitioners would expand the grant to any substance that man can strip by modern means from the coal's backbone. See Pet. Br. 44 ("Something 'present in' coal is not part of the coal itself").

In order to obscure how their interpretation subverts the purpose of the reservation, Petitioners call upon the doctrine of accommodation. Pet. Br. 48. The accommodation doctrine, however, is not an interpretative aid for

ascertaining the grantor's intent as to the subject matter of the grant. Rather, the purpose of this common law doctrine, like its cousin the doctrine of alternative means, is to adjust the correlative or implied rights of each estate. See 6 *American Law of Mining* § 200.02[1][B], at 200-8 (2d ed. 1998). Quite apart from the accommodation doctrine that comes off the bench only once a conflict arises, the pertinent inquiry for arriving at the subject matter of a grant and reservation is their purpose in terms of the contemplated uses. *Western Nuclear*, 462 U.S. at 52; cf. *Leo Sheep Co. v. United States*, 440 U.S. 668, 680-82 (1979). In this regard, it is unreasonable to suppose that Congress ever intended to convey an interest in a substance that went unnamed in the grant but, nonetheless, knew existed in the coal and would be destroyed in the exploitation of the reservation. Nor is it reasonable to infer that Congress intended to burden the reservation in a manner that would gravely frustrate its purpose as well as severely diminish its value. See Pet. Br. 48 (discussing conflicts, *e.g.*, damage to the coal, explosion and flooding hazards to miners; leaving coal unmined to support gas wells; compensation for use of other estate). There is no reason to speculate about what Congress would have thought about an emerging common law doctrine had "it considered the issue of [coalbed methane] extraction." Pet. Br. 49. The fact of the matter is that in providing for the payment of surface damages, 30 U.S.C. §§ 81, 85, Congress expressly addressed what accommodation was necessary in view of the only common use of the same estate that it contemplated. This should foreclose any argument that title to coalbed gas and, for that matter, any other substance in coal passed by implication under the grant.

In any event, the accommodation doctrine is also inapposite for practical reasons. First, most courts that have

confronted this question consider the doctrine inadequate to the task. See *Vines v. McKenzie Methane Corp.*, 619 So.2d 1305, 1308 (Ala. 1993) (methane and coal mining are inextricably intertwined); *United States Steel Corp. v. Hoge*, 468 A.2d 1380, 1384 (Pa. 1983) (damage to coal is only within coal owner's dominion to inflict). But see *Carbon County v. Union Reserve Coal Co.*, 898 P.2d 680, 689 (Mont. 1995) (coal grantee has mutual simultaneous right to capture gas for safety purposes). Second, the reciprocal right to access one's mineral estate to which Petitioners refer (Pet. Br. 47-48 (citing *Chartiers Block Coal Co. v. Mellon*, 25 A. 597 (Pa. 1883)), is entirely different than the occupation and use of the coal estate in order to extract its constituents. Indeed, as *Chartiers'* progeny makes clear, the reciprocal right to drill *through* the coal to access the gas estate below cannot be extended to sanction a tangible invasion and use of the possessory interest in the coal estate. *Hoge*, 468 A.2d at 1384.[6]

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[6] Petitioners' strain in their reasoning for eschewing *Chartiers'* progeny when they claim that the result in *Hoge* can be explained away by "idiosyncracies [of] Pennsylvania's geology and its 'stratum' theory of minerals ownership." Pet. Br. 49 n.24. Amicus, whose members include those who mine coal deposits in Pennsylvania and in 1909 and 1910 Act lands, must profess an unawareness of any geological anomalies that inform the question differently as to how methane is formed and adsorbed in the coal through coalification. With respect to the so-called 'stratum' ownership theory, the same result was reached in Alabama which follows the nonownership theory for oil and gas. See *NCNB Texas Nat'l Bank, N.A. v. West*, 631 So. 2d 212, 223-24 (Ala. 1993) (conveyance of coal includes the right to reduce to possession any gas trapped in the coal); *Vines*, 619 So. 2d at 1309 (grant of all coal includes total control over any substances within it). There is also a practical difference that deserves mention. Unlike a methane well, a conventional oil and gas well can be sealed below the coal seam, the coal mined, and the well reestablished after mining passes. *See* M.G. Zabetakis et al., *Methane Emissions in Coal Mines: Effects of Oil and Gas Wells* 8 (Bureau of Mines Report of Investigations 7658, 1972).

Because their interests lie elsewhere, Petitioners and their amici can, without pause, dismiss "damage to the coal [as] ha[ving] no bearing on title." Pet. Br. 47. See also Farm Bureau Br. 11; CBM Ad. Hoc. Comm. Br. 27. After all, their lives and livelihoods will not depend upon the physical integrity of the coal seam after it has been drilled and fractured repeatedly. See generally *Legal Environmental Assistance Foundation, Inc.*, 118 F.3d at 1471 (11th Cir. 1997) (describing the results of coal hydrofracturing as fractures that extend several hundred feet with significant amounts of injected fluids, *e.g.*, diesel oil, acids, sand and other additives, left in the coal). But, what strikes us as unprincipled is their attempt to enlist the accommodation doctrine as an interpretative aid, yet dismiss damage to the coal estate as lacking any informative value with respect to Congress' intent. The Tenth Circuit had ample reason for rejecting this ploy. Pet. App. 20a-21a (unreasonable to impute to Congress an intent to convey an integral component of coal that could not be extracted without damage or destruction of the coal).[7]

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[7] To be sure, the contemporary technology that now makes possible the commercial extraction of methane from coal does not give rise to the complete physical destruction of the coal. But substantial concerns exist with the affects they have on mining conditions. Studies conducted by the Bureau of Mines with the cooperation of amicus' members indicate that degasification of coal seams in advance of mining can be conducted while minimizing adverse affects on mine roof conditions. Of course, these studies were conducted under controlled conditions for the singular purpose of improving mine safety—a purpose that is not necessarily in accord with a desire to maximize methane production for commercial purposes. The generally favorable results of these case studies notwithstanding, the Bureau of Mines also concluded that "[i]t is impossible to guarantee that a stimulation treatment of a coalbed will not adversely affect mining in some way." William Diamond and David Oyler, *Effects of Stimulation Treatments on Coalbeds and Surrounding Strata* 45 (Bureau of Mines Report of Investigations 9083, 1987).

Petitioners' interpretation of the Acts also places the coal estate Congress reserved at substantial economic risk. The development of the coal would become dependent largely upon the initiative of others whose interests are not the same as Congress' objective when it reserved the coal estate. The postponement of mining until surface patentees or their successors drain the coal estate of its methane constituents frustrates the original purpose for the reservation, and jeopardizes the federal coal lessee's adherence to the conditions under which the coal lands were disposed by lease. See Mineral Leasing Act, 30 U.S.C. § 207(a) (coal lease terminated if not producing in commercial quantities within ten years, and continuously thereafter).[8] The avoidance of coalbed methane wells by mining around them involves great expense and leaves behind substantial amounts of the coal. At the same time, it serves little purpose because mining around the well isolates the well from the entire coal seam reservoir that serves as the source of methane.[9] Plainly, this

[8] The diligent development and continuous production conditions in federal coal leases require the annual production of at least 1% of the leased reserves, 45 C.F.R. § 3480.05(a)(6), which can mean well over one million tons. The initial satisfaction of this condition often requires all ten years since the planning and permitting of a mine on federal lands often exceeds 7 years.

[9] The amount of coal left behind permanently by this futile gesture toward "accommodation" is substantial by any measure. Using the minimum 300-foot buffer required by the Mine Safety Act, 30 U.S.C. § 877, an underground coal mine with a seven-foot coal seam would leave at least 100,000 tons of coal for a single well. At a surface mine in Wyoming, where coal seams can exceed 70 feet in thickness, the same barrier would force the bypass of more than 1 million tons of coal in place—more coal than almost 90% of the mines in this country produce annually. The above estimates are derived by using a coal density factor of 1770 tons per acre foot of coal thickness, *e.g.* 1 acre x 7 feet x 1770 tn/ft./acre. A 300 foot barrier on all sides of a well results in a 600 foot square of coal around the well which equals 360,000 square feet, or 8.26 acres. In many cases operational considerations would require more coal to be left than portrayed in these examples. The coal is left behind permanently—practical and economic constraints do not permit the men and machines to return later.

is not what Congress contemplated when it opened the surface of coal lands to agricultural settlement, but reserved all the coal for future development.

CONCLUSION

The judgment of the court of appeals should be affirmed.

Respectfully submitted,

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April 2, 1999